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David Whitehead

Philo Mechanicus: *On Sieges*

Translated with Introduction and Commentary

Franz Steiner Verlag

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TABLE OF CONTENTS

Preface 7

Conventions and Abbreviations 9

Measures, Weights, Volumes 13
(1) (Linear) Measures 13
(2) Weights 13
(3) Volumes 14

Introduction 15
(A) Basics 15
(i) Text(s) 15
(ii) Translations 16
(iii) Sources 17
(iv) Use and Influence 17
(B) The Work and its Author 20
(C) Style, Tone and Terminology 25
(i) Fortification(s) 28
(ii) Machinery 30
(iii) *plagios* and *orthios* 32
(D) The Besieged Community in Aeneas Tacticus and Philo 33
(i) The Polis 34
(ii) Natural Features 36
(iii) Man-Made Features 37
(iv) Women, Children and Families 41
(v) Animals 42
(vi) Slave, Foreigner, Citizen 45
(vii) Constitution and Government 48
(viii) The Military 49
(ix) The Gods 51
(x) Overview 52
Internal (Dis)Organisation of the Treatise 60
Some Textual Issues 63

Text and Translation 65

Commentary 133
Part A: Fortification(s) 133
Part B: Provisioning and Preparation 219
Part C: Defensive Measures 272
Part D: Attacking Measures 333
Appendix 1: Vitruvius, *de architectura* 1.5.1–8 404
Appendix 2: Athenaeus Mechanicus 15.13–18.7 (and Vitruvius 10.14.1–3) ... 409
Appendix 3: Philo-derived passages in the *Parangelmata Poliorketika* 412
Appendix 4: The walls of Skotoussa 417
Appendix 5: Granaries and grain-preservation in *Geoponica* 2.27–30 425
Gazeteer 429
Bibliography 439
Index of Passages Cited 447
Greek Index (Select) 487
General Index 495

PREFACE

Had this book been written a generation ago, it could have begun with the claim that Philo's *Paraskeuastika* and *Poliorketika* (which I here subsume under a title of my own devising: *On Sieges*) has suffered from neglect, not least at the hands of those who ought to have taken particular account of it. In saying so I have in mind, above all, W. Kendrick Pritchett's five-volume *The Greek State at War* (1971-1991), a survey celebrated for its coverage of the relevant ancient sources and the bibliography they have generated. While most of this praise is richly deserved, Pritchett had a blind-spot where Philo is concerned: not a single passage of his is cited. Most of Pritchett's successors have made amends, but even the recent *Cambridge History of Greek and Roman Warfare*, vol. I, categorizes Philo too narrowly as a writer on mechanics and artillery.

Nowadays, those who know Philo's *On Sieges* belong mostly in one of two camps. The larger group mounts targeted raids into the work, to seize and carry off individual nuggets of information. A nucleus of specialists, in fields like warfare and Hellenistic culture, prizes it as a whole within those specialisms. The generalists are likely to be aware (or can readily discover) that translations and/or commentaries already exist, and they might well wonder why another is necessary. The specialists already know that these existing translations and commentaries, for all their many and undoubted merits, do not furnish a totally satisfactory exegetical resource, even in aggregate. Beyond that, if any have contemplated supplying such a resource themselves, the difficulties entailed will have been a deterrent. Ideally, a consortium of experts would undertake the task – but since such a body has shown no sign of coming into existence and setting about its labours, I proffer here one scholar's attempt to do the necessary. My aim, in effect, has been to provide users of this material with the sort of help I would have wished to find myself, for coming to serious grips with it: an Introduction to Philo and the *On Sieges*; a considered view of the text and what it means; a translation closely mapped onto the Greek (see further below); and a Commentary which expounds and explains, to the best of my ability, the many and various matters arising.

On one particular point I did seek advice. Duncan Campbell's opinion was invaluable at a time when my doubts about the transmitted text – on the allegedly defensive use of rams – needed to be either dispelled or confirmed. (Naturally, he shares no blame for other errors of fact, judgment or omission I may be deemed to have made.)

Whatever else it is, this is the first complete translation of Philo's treatise into English; so let me stress that the translation aspect of what I have done here is purely functional. The shrunken, often inept form in which Philo's original work has been transmitted is repetitious and creaky to a high degree. In that and other respects it is the proverbial sow's ear. Conversion into a silk purse would have been quite possible, but would also have been very misleading.

I am grateful to the editors of *Historia*, who have here for the third time extended the hospitality of the *Einzelschriften* series to a work of mine in this austere but compelling genre. Again too I am indebted to my dear wife Arlene Spiers. She must often have wished that less of my energy went into feeding the compulsion, but she has always been unselfish enough not to say so.

Belfast

January 2016

CONVENTIONS AND ABBREVIATIONS

1. All ancient dates are BC(E) unless otherwise indicated.
2. The author of the text which is my concern here – Philon (Φίλων) in Greek, Philo in Latin – is routinely foreshortened to Ph.
   Conventions for abbreviating the names of other ancient writers and their works mostly follow those of standard reference-works such as LSJ, the OCD and the online TLG Canon – any deviations from such standards being in the direction of greater explicitness. (On the impossible matter of consistency between Latinization and transliteration, I enter the usual disclaimer. See also the introduction to the Gazeteer.)
3. The editions of Ph. by Thévenot, Graux, Schoene, Diels-Schramm and Garlan (see Introduction A.i) and the translations by Rochas d'Aiglun and Lawrence (see Introduction A.ii) are all cited by the name of the editor or translator only. Ph.'s material on siege-warfare, the subject of the present book, is cited without title, and primarily by the four content-determined parts (A-D), and short sections thereof, devised by Diels-Schramm and taken over by Garlan, Lawrence and others. In almost all instances I add precision to this by line-numbers within sections. I also give (in italics within square brackets) equivalences in Thévenot pages and lines, since they remain useful for identifying passages which feature in LSJ* and quite frequently, still, elsewhere.
   [Ph.'s *Belopoiika* (*Artillery-manufacture*), which I abbreviate as *Bel.*, is cited by Thévenot pages and lines, taken over by Schoene and by Diels-Schramm (Berlin 1919). (Marsden, *Treatises*, reformats with longer lines; see p.15 there.)]
4. For secondary literature, note the following abbreviations:

AIO	Attic Inscriptions Online (www.atticinscriptions.com)
Austin^2	M.M. Austin, *The Hellenistic World from Alexander to the Roman Conquest* (2nd. edn. Cambridge 2006)
BA	*Barrington Atlas of the Greek and Roman World*, ed. R.J.A. Talbert (Princeton 2000)
BA(D)	*Barrington Atlas of the Greek and Roman World: map-by-map Directory*, ed. R.J.A. Talbert (2 vols. with continuous page-numbering: Princeton 2000)
Bagnall/Derow^2	R.S. Bagnall and P.S. Derow (ed. and tr.), *The Hellenistic Period: historical sources in translation* (2nd. edn Oxford 2004)

* LSJ wrongly cites *all* of Ph. as '*Bel.*', and further claims that Diels and Schramm also give 'page and line of Wescher'. Of Thévenot, rather. Carl(e) Wescher's *Poliorcétique des Grecs* (Paris 1867) excluded Ph. because he does not feature in the *Parisinus inter supplementa graeca* 607 manuscript, which furnished Wescher's criterion for inclusion; cf. Garlan 287.

BNP	*Brill's New Pauly: Antiquity*, ed. H. Cancik and H. Schneider [English edn., ed. C. Salazar] (Leiden & Boston 2003–2010)
Burstein	S. M. Burstein (ed. and tr.), *The Hellenistic Age from the battle of Ipsos to the death of Kleopatra VII* (*Translated Documents of Greece and Rome* 3: Cambridge 1985)
DCPP	E. Lipinski (ed.), *Dictionnaire de la civilisation phénicienne et punique* (Paris 1992)
FGrH	F. Jacoby, *Die Fragmente der griechischen Historiker* (Berlin & Leiden 1926–1958)
Harding	P. Harding (ed. and tr.), *From the end of the Peloponnesian War to the battle of Ipsus* (*Translated Documents of Greece and Rome* 2: Cambridge 1985)
HCA	A. B. Bosworth, *A Historical Commentary on Arrian's History of Alexander* (Oxford 1980–1995)
HCP	F. W. Walbank, *A Historical Commentary on Polybius*, three volumes (Oxford 1957–1979)
HCT	A. W. Gomme, A. Andrewes, K. J. Dover, *A Historical Commentary on Thucydides*, five volumes (Oxford 1945–1891)
IACP	M. H. Hansen and T. H. Nielsen (ed.), *An Inventory of Archaic and Classical Poleis* (Oxford 2004)
I.Alexandreia Troas	M. Ricl (ed.), *The Inscriptions of Alexandreia Troas* (Bonn 1997)
I.Cret.	M. Guarducci (ed.), *Inscriptiones Creticae* (Rome 1935–1950)
I.Eph.	H. Wankel, R. Merkelbach et al. (ed.), *Die Inschriften von Ephesos* (Bonn 1979–1981)
IG	*Inscriptiones Graecae* (Berlin 1873-)
IGR	*Inscriptiones Graecae ad res Romanas pertinentes* (Paris 1911–1927)
I.Perge	S. Şahin (ed.), *Die Inschriften von Perge*, I (Bonn 1999)
ISE	L. Moretti (ed.), *Iscrizione storiche ellenistiche* I–II (Florence 1967–1975)
I.Smyrna	G. Petzl (ed.), *Die Inschriften von Smyrna* (Bonn 1982–1990)
KP	K. Ziegler at al. (ed.), *Der Kleine Pauly* (5 vols.: Munich 1964–1975)
LSJ	H. G. Liddell, R. Scott, H. S. Jones, *A Greek-English Lexicon*, ninth edn., with revised Supplement (Oxford 1996)
Maier	F. G. Maier, *Griechische Mauerbauinschriften* I–II (Heidelberg 1959–1961)
OCD	S. Hornblower, A. Spawforth, E. Eidinow (ed.), *The Oxford Classical Dictionary*, fourth edn. (Oxford 2012)

OGIS	W. Dittenberger (ed.), *Orientis Graecae Inscriptiones Selectae* (2 vols.: Leipzig 1903–1905, reprinted Hildesheim 1986)
PECS	R. Stillwell, W. L. MacDonald, M. H. McAlister (ed.), *Princeton Encyclopedia of Classical Sites* (Princeton 1976)
PCairZen	C. C. Edgar and others (ed.), *Zenon Papyri* (Cairo 1925–1940); on-line at p.cair.zen
PLond	F. G. Kenyon and others (ed.), *Greek papyri in the British Museum* (London 1893-); on-line at p.lond
POxy	B. P. Grenfell, A. S. Hunt and others (ed.), *Oxyrhyncus Papyri* (London 1898-); on-line at p.oxy
PSI	*Pubblicazioni della Società italiana per la ricerca dei papiri greci et latini in Egitto* (Florence 1912-)
PTeb	B. P. Grenfell, A. S. Hunt and others (ed.), *Tebtunis Papyri* (London 1902–1976)
RE	A. F. Pauly, G. Wissowa, W. Kroll et al. (ed.), *Real-Encyclopädie der classischen Altertumswissenschaft* (Stuttgart 1894–1980)
RO	P. J. Rhodes and R. Osborne (ed. and tr.), *Greek Historical Inscriptions 404–323 BC* (Oxford 2003)
Samama	E. Samama, *Les médecins dans le monde grec. Sources épigraphiques sur la naissance d'un corps médical* (Geneva 2003)
SB	F. Preisigke and others (ed.), *Sammelbuch griechischer Urkunden aus Aegypten* (Berlin and elsewhere, 1913-)
Schwenk	C. J. Schwenk, *Athens in the Age of Alexander: the dated laws and decrees of 'the Lykourgan era' 338–322 BC* (Chicago 1985)
SEG	*Supplementum Epigraphicum Graecum* (Leiden 1923-)
SGDI	H. Collitz et al. (ed.), *Sammlung der griechischen Dialekt-Inschriften* (Göttingen 1884–1915)
Staatsverträge	H. H. Schmitt (ed.), *Die Staatsverträge des Altertums, dritter Band: Die Verträge der griechisch-römischen Welt von 338 bis 200 v. Chr.* (Munich 1969)
Syll.[3]	W. Dittenberger (ed.), *Sylloge Inscriptionum Graecarum*, third edition (4 vols.: Leipzig 1919–1924, reprinted Hildesheim 1982)

MEASURES, WEIGHTS, VOLUMES

Where Ph. gives exact figures I leave them in their original Greek terms, translated or transliterated, in the Translation but add present-day (metric) equivalents in parenthesis.

(1) (LINEAR) MEASURES

In the ancient Greek "Olympic" system the smallest unit was the dactyl (δάκτυλος); four dactyls made a palm (παλα(ι)στή), twelve dactyls a span (σπιθαμή), sixteen dactyls a foot (ποῦς), and twenty-four dactyls a cubit (πῆχυς). I follow here B. Cotterell and J. Kamminga, *Mechanics of Pre-industrial Technology* (Cambridge 1990) 19 (Table 2.1) in operating with millimetre equivalents as follows: dactyl 19.25; palm 77; span 231; foot 308; cubit 462. See also E. W. Marsden (*Greek and Roman Artillery: Historical Development* [Oxford 1969] xix; *Greek and Roman Artillery: Technical Treatises* [Oxford 1971] xvii), based ultimately on F. O. Hultsch, *Griechische und Römische Metrologie* (edn.2, Berlin 1882) Erster Theil, §§ 5–11.

Given Ph.'s subject-matter, especially in part A (fortifications), the cubit unsurprisingly features most: see A9.3–4 [*80.13–14*], A10.2 [*80.17*], A11.3 [*80.21*], A12.2 [*80.26*], A13.3 [*80.30*], A17.3 [*80.47*], A17.5 [*80.49*], A18.3 [*80.51*], A19.2–4 [*81.1–3*], A20.4 [*81.9*], A45.3–4 [*83.17–18*], A46.5–6 [*83.22–23*], A69.4 [*84.46*], A70.2 [*84.48*], A71.1–3 [*85.1–3*], A72.3 [*85.6*], B12.1 [*87.13*], B12.5 [*87.17*]. In the few contexts where he needs something smaller, he chooses, as appropriate, the dactyl (B6.4–5 [*86.42–43*]), the palm (C53.7 [*94.49*]) and the span (A29.3–4 [*81.49–50*], C26.2–3 [*93.2–3*], D17.9–10 [*98.12–13*], D31.4–5 [*99.16–17*]). No length is expressed in feet.

Four passages include linear dimensions larger than – or in effect multiples of – the cubit. A45.4 [*83.18*], amidst other figures given in cubits, has a wall-height of six *orguiai* ("fathoms"); an *orguia* is six feet (1.5 cubits), hence 1.85 m. A69.3 [*84.45*], immediately before one recommended trench-to-wall interval given in cubits, gives one of a *plethron*: a hundred feet, hence 30.8 m. And in A38.1 [*82.41*] and B53.3–4 [*90.16–17*] there are long distances measured by the stade (στάδιον): six *plethra*, hence 184.8 m.

(2) WEIGHTS

Weights in Ph. are confined to specifications of the weights of stone – probably expressed on the Attic-Euboic scale, in widespread "international" use – capable of being discharged by stone-projecting artillery (or by other means: below). I follow

here Cotterell and Kamminga, *Mechanics* 21 (Table 2.2) in operating with metric equivalents of 436.6 gr. for the mina (μνᾶ) and, accordingly, 26.2 kg. for the talent (τάλαντον). See also Marsden, *Treatises* xviii, based ultimately on Hultsch, *Metrologie* Zweiter Theil, § 19.

Such calibres expressed in minas here range from the miniature two (D31.5–6 [*99.17–18*]) through ten (C6.2 [*91.16*], C26.2 [*93.2*], D17.9 [*98.12*]) and twenty (C56.2–3 [*95.10–11*]) to thirty (C57.3 [*95.17*], C67.2–3 [*95.50–51*]). A projector of stones twice the size of the largest of these, therefore, is the 'one-talent' rock-projector mentioned in A29.6 [*82.1*], A70.4 [*84.50*], A71.1–2 [*85.1–2*], and A73.3 [*85.8*]. In C10.4–6 [*91.36–38*], stones of this same size are dropped by defenders through windows, and C8.1–4 [*91.25–28*] has three-talent stones being propelled through a 'pipe': see the Comm. there.

(3) VOLUMES

In the sections of part B devoted to foodstuffs in general, and recipes in particular, Ph. has occasion to use various measures of volume/capacity, both dry (ξηρά) and wet (ὑγρά). Dry measures mentioned, in B35.1–5 [*88.43–47*], are the specifically Attic (half-)*hekteus* for sesame and the *choinix* for almonds; there are eight *choinikes* to the *hekteus*. That same recipe also specifies quantities of wet ingredients by the (half-)*chous* for honey and the *kotylê* for oil; there are twelve *kotylai* to the *chous*. *Kotylai* (of wine and honey) reappear in B42.5–6 [*89.19–20*], *choes* (of water) in B54.2–3 [*90.25–26*]; and B54.3 [*90.26*] also measures vinegar by the *kyathos*, one-sixth of a *kotylê*.

B55.2–3 [*90.29–30*] mentions a very large vessel, at least four *metrêtai* (forty-eight *choes*) in size, to be used in signalling.

I follow here Hultsch, *Metrologie* Erster Theil § 16 (with Tabelle X) in operating with metric litre equivalents as follows: *kyathos* 0.0456, *kotylê* 0.274, *choinix* 1.094, half-*chous* 1.642, *chous* 3.283, half-*hekteus* 4.377, *metrêtes* 39.39.

INTRODUCTION

(A) BASICS

(i) Text(s)

The principal manuscripts are three in number: E (*Scorialensis graecus* Y-III-11), from the end of the 10th century; V (*Vaticanus graecus* 1164) and P (*Parisinus graecus* 2442), from the beginning of the 11th. Editors have envisaged a variety of stemmatic relationships between them: see in brief Garlan 285–286, with bibliography. References, hereinafter, to 'the manuscripts' will mean these principal ones unless otherwise indicated. Some of the later (15th to 17th century), derivative ones are surveyed in Graux 102–104. For *Vaticanus graecus* 1605 (11th century), which includes a scholiast's text of Ph.'s B32–40 [*88.32–89.10*], see the Comm. to B32 under **ἀφεψηθείσης**.

The *editio princeps* is Melchisédec(h) Thévenot and others, *Veterum mathematicorum Athenaei, Apollodori, Philonis, Bitonis, Heronis et aliorum opera Graece et Latine pleraque nunc primum edita* (Paris 1693) 79–104. Though Thévenot's actual text has long since been superseded, largely because it was based on a single late manuscript (the 16th-century *Parisinus graecus* 2435), his page-numbers and (usually) line-numbers are a referencing-system still widely in use; see above, Conventions and Abbreviations, 3.

The first section (Thévenot 79–86.21) – taken as an autonomous book of *Teichopoiika*, *Fortification-matters*[1] – was re-edited by Charles Graux, 'Philon de Byzance: Fortifications', *Revue de Philologie* 3 (1879) 91–151, posthumously reprinted in his *Oeuvres* (Paris 1886) 2.153–227. This comprises a general introduction, parallel text and translation, and 'notes explicatives'. During the course of it, the co-authorship of the amateur polymath and military specialist Eugène August Albert de Rochas d'Aiglun is acknowledged; see also below, under Translations.

The following three re-editions embrace the complete text:

Richard Schoene, *Philonis Mechanicae Syntaxis libri quartus et quintus* (Berlin 1893). [No page-numbering.] A root-and-branch textual revaluation, incorporating many otherwise unpublished suggestions by August Brinkmann, Franz Buecheler, Hermann Diels, Friedrich Haase, Alfred Schoene (Richard's brother), Hermann Schoene (Richard's son), and Johannes Vahlen.

Hermann Diels and Erwin Schramm, *Exzerpte aus Philons Mechanik B.VII und VIII (vulgo fünftes Buch). Griechisch und Deutsch.* (*Abhandlungen der preussischen Akademie der Wissenschaften, philosophisch-historische Klasse* no. 12: Berlin 1919 [1920]). A new text, with German translation, brief notes, and 33 fig-

1 Erroneously listed as *Technopoiika* by K. Orinsky et al., 'Philon(48)', *RE* 20.1 (1941) cols.53–54, at 54.

ures; and an unpublished 1886 edition (with translation and 'Erläuterung') of Thévenot 79–86.21 by Ernst Fabricius is incorporated.

Diels-Schramm is the text available on the on-line TLG.

Yvon Garlan, *Recherches de poliorcétique grecque* (*BEFAR* fasc. 223: Paris 1974) 278–404. After an Introduction, Garlan gives a parallel text and French translation, and a commentary in the form of endnotes; they are most lavish on the first (archaeological) section of the treatise.

The labours of this succession of scholars (and others), especially in the century which spans Graux to Garlan, have made very significant advances toward the most plausible and satisfactory text of Ph. that can be established. Nevertheless, what he wrote – and/or what he meant by it – remains in many places uncertain.

(ii) Translations

Into French: Graux, Garlan; see already under Text(s). Also, a few years earlier than Graux, Rochas d'Aiglun published an annotated French translation based on Thévenot's text: *Traité de fortification d'attaque et de défense des places par Philon de Byzance* (Paris 1872).[2]

Into German: Diels-Schramm; see already under Text(s).

Into English. The principal item here is A.W. Lawrence, *Greek Aims in Fortification* (Oxford 1979) 69–107. After an Introduction, he translaties all parts 'relevant, even indirectly, to the study of fortifications'. (This turns out to mean: A1–87 [*79.1–86.21*], i.e. part A complete; B49–53 [*89.46–90.24*]; C1 [*90.46–49*], C3–44 [*91.3–94.20*], C49–59 [*94.32–95.25*], C63–71 [*95.32–96.14*]; D1–11 [*96.27–97.34*], D17–19 [*98.4–20*], D24–27 [*98.34–99.3*], D29–51 [*99.6–100.32*], D55–58 [*100.39–101.2*], D66 [*101.31–35*], D71–75 [*102.3–27*], D111 [*104.40–42*].) There is no continuous Greek text, but the parallel 'analysis and notes' includes occasional textual observations and suggestions amidst the substantive comment.

Brian Campbell, *Greek and Roman military writers: selected readings* (London 2004), provides an all-purpose selection of eight short translated extracts (A20–21 [*81.6–25*], A32–33 [*82.6–21*], B1–2 [*86.21–32*], B49–50 [*89.46–90.5*], C3–5 [*91.3–15*], C32–36 [*93.25–44*], D59–60 [*101.2–11*], D71–72 [*102.3–12*]). W.M. Murray, *The Age of Titans: the rise and fall of the great Hellenistic navies* (Oxford 2012) 283–301 (= Appendix E), is a translation, with footnotes, of the material relating primarily to naval warfare (C51–71 [*94.36–96.14*], D5 [*96.37–41*], D21–33 [*98.24–99.20*], D38 [*99.37–40*], D53–55 [*100.33–44*], D101–111 [*104.1–42*]).

2 It is partially available on-line at http://remacle.org/bloodwolf/erudits/philon/fortification1.htm (or via attalus.org).

(iii) Sources

Ph. never names his sources, and in all but one instance they are indeterminable by name. The exception, whether he had read it directly or in the epitome by Cineas the Thessalian,[3] is unsurprising: his best-known predecessor in the genre, Aeneas Tacticus (mid-fourth century).

Aeneas's *Procurement* (*Poristikê biblos*, which its author mentions in 14.2) and *Preparations* (*Paraskeuastikê biblos*, mentioned in 7.4, 8.5, 21.1 and 40.8) are both lost, a fact which obscures the most vital aspects of how far they might underpin the recommendations in Ph.'s part B;[4] but other links are clear enough, to varying extents. A particularly striking instance occurs with B55–57 [*90.28–45*], where a system for adding detail to fire-signals by the use of the synchronized outflow from two water-vessels stems from an Aenean invention reported by Polybius 10.44–45. See also (e.g.) the following passages of Aeneas:

7.1 (and 10.4), *re* D2–3 [*96.28–33*];
22.7–8, *re* C34 [*93.32–36*];
24–25, *re* C29 [*93.8–11*] and C35–38 [*93.36–52*];
26.3, *re* C28 [*93.5–8*];
31 (esp. 10–13), *re* D77–82 [*102.31–50*] (esp. D80–81 [*102.40–47*]);
32.8, *re* A76 [*85.22–29*];
32.12, *re* C18 [*92.22–27*];
33.1, *re* C39–41 [*94.1–10*], etc.;
34.1, *re* D34–35 [*99.21–28*];
36, *re* A79 [*85.35–39*];
37.1, *re* C7 [*91.19–24*];
37.3, *re* D32 [*99.18–19*];
39.1–2, *re* C32 [*93.25–29*];
39.6–7, *re* C65 [*95.39–44*] and D41 [*99.48–51*].

On Ph.'s apparent use (direct or indirect) of Hippocratic treatises see below, section B (end), and again in the preface to the Commentary on part B.

(iv) Use and Influence

The first unambiguous proofs of Ph. being used by his successors in the genre come in two interconnected writers of the second half of the first century: Athenaeus of (?)Seleucia, a.k.a. Athenaeus Mechanicus, and Vitruvius.[5]

3 On Cineas see in brief D. Whitehead (ed.), *Aineias the Tactician: How to Survive under Siege* (Oxford 1990; edn.2 with addenda and corrigenda Bristol 2001) 6; M. Bettalli (ed.), *Enea Tattico: La difesa di una città assediata* (Pisa 1990) 4.

4 See generally Bettalli, *Enea* 337; and (on this and the other passages cited) in the Comm. below.

5 On their interconnection see most recently D. Whitehead and P.H. Blyth (ed.), *Athenaeus Mechanicus: On Machines* (*Historia* Einzelschriften 182: Stuttgart 2004) *passim*.

The latter's *de architectura* mentions Ph. explicitly, in an unchronological list of twelve authorities given in chap.14 of the preface to his Book 7: *Diades Archytas Archimedes Ctesibios Nymphodorus Philo Byzantius Diphilos Democles Charias Polyidos Pyrros Agesistratos*. It is noteworthy that only Ph., in this roster, is thought to need an ethnikon – so as to avoid confusion with homonyms, presumably; and his origins in Byzantium are confirmed by two other (later) writers.[6] In any event, Vitruvius had already drawn on Ph. without citing him by name in an earlier context; for Book 1 chap.5 of Vitruvius sounds unmistakable echoes of what Ph. says, at length, about city-wall construction and related topics in his part A. See **Appendix 1**.[7]

Athenaeus, for his part, does not deal with fortifications and thus does not draw on that material; nor does he proffer a consolidated list of names like the one in Vitruvius. Instead, he introduces his authorities *seriatim*. The one named at 15.13 is 'Philo of Athens' (Φίλων ὁ Ἀθηναῖος) – but since that writer is cited there for the construction of a filler tortoise, χελώνη χωστρίς, as mentioned in our Ph.'s D10.7–11 [*97.25–29*], there can be no doubt that the designation 'ὁ Ἀθηναῖος' is a slip (whether by Athenaeus himself, his immediate source Agesistratus, or a copyist).[8] See **Appendix 2**.

Next comes Onasander's treatise *On Generalship* (*Stratêgikos*), addressed in Greek to the Quintus Veranius who was consul *ordinarius* in 49 CE and subsequently governor of Britain.[9] Though the sources of Onasander's morally-driven – notionally Platonic (Suda o 386) – advice to generals are never stated, there seems little doubt that he had read and absorbed Ph., whether directly or indirectly. Some of the correspondences between the two works are no more striking than would be expected from two writers who cover many of the same topics; and the limits on the scope and extent of those correspondences are unsurprising when one bears in mind that at no point does Onasander take up the stance represented by Ph.'s parts A-C, that of a city-commander who is resisting a siege. On the other hand he does, at

6 Hero, *de automatis* 20.1 (τῶν ὑπὸ Φίλωνος τοῦ Βυζαντίου ἀναγεγραμμένων); Eutocius, *Commentaries on [Archimedes'] de sphaera et cylindro* 60.28 (Ὡς Φίλων ὁ Βυζάντιος). (See Garlan 284.) Both of these allusions are to other parts of Ph.'s output, but the identification is certain.

7 See also, for Babylon and 'bitumen' (Vitruvius 1.5.8), B53.5 [*90.18*] with Comm.

8 Vitruvius does not make the same mistake, but does twice (in chaps.12 and 17 of the Preface to his Book 7) refer to the individual with whom Athenaeus's 'Philo of Athens' should be identified: the architect and writer Philon Exekestidou of Eleusis, second half of the fourth century (OCD Philon(1)); so e.g. Garlan 284; Whitehead and Blyth, *Athenaeus* 108–109. The correction of Athenaeus's slip here was attributed by Whitehead and Blyth to R. Schneider, *Griechische Poliorketiker mit den handschriftlichen Bildern herausgegeben und übersetzt, III: Athenaios, Über Maschinen* (*Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen, philologisch-historische Klasse*, Neue Folge 12 no.5: Berlin 1912) 59–60; however, see already Graux 99.

9 See generally W.A. Oldfather et al., *Aeneas Tacticus – Asclepiodotus – Onasander: with an English translation by members of the Illinois Greek Club* (Cambridge Mass. & London [Loeb Classical Library] 1923) 341–527; C.J. Smith, 'Onasander on how to be a general', in M. Austin et al. (ed.), *Modus Operandi: essays in honour of Geoffrey Rickman* (London 1998) 151–166; C. Petrocelli, *Onasandro, Il Generale* (Bari 2008).

40–42, have his general *prosecute* a siege, and it is in those sections above all that we find him saying much what Ph. (particularly in part D) had said.[10]

In a much later age, Ph.'s treatise, together with others of its kind, exerted a discernible influence upon middle-Byzantine siege-writing.[11] I mention here three prime manifestations of this.

One is the text formerly known as the anonymous Περὶ στρατηγικῆς (*De re strategica*) and dated to the sixth century CE; it is nowadays regarded as one of three parts of the *Military Compendium* by Syrianus Magister, and placed in the ninth or even tenth century.[12] Though Syrianus never mentions Ph. by name – because, like Onasander, it is not his habit to name sources at all – there are some echoes of Ph. in the sections entitled 'How one should found a city' (12) and 'How one should make preparations against the machines of the besiegers' (13). They will be noted in the Commentary where they arise. So too will the occasional echoes (probable or possible) of Ph. in the treatise Ὅπως χρὴ τὸν τῆς πολιορκουμένης πόλεως στρατηγὸν πρὸς τὴν πολιορκίαν ἀντιτάττεσθαι καὶ οἷοις ἐπιτηδεύμασι ταύτην ἀποκρούεσθαι (*How the general of a city under siege should withstand the siege and with what sort of methods to repel this*), better and more conveniently known as the *De obsidione toleranda*, compiled apparently in the first half of the tenth century CE.[13]

Ph.'s treatise was also (and more extensively) quarried by his purported fellow-citizen "Heron of Byzantium" – actually another anonymous writer of the tenth century CE. Assigned the title *Parangelmata Poliorketika* (*Siege-warfare Instructions*) by its editor Rudolf Schneider,[14] the work is most easily accessible nowadays in a painstaking re-edition by the American Byzantinist Denis Sullivan.[15] The exemplary list of μηχανικοί who are this Byzantine writer's sources (197.7–

10 See the Commentary to D4 under **εἰ δὲ μή**, D6 under **πρῶτον**, D9 under **ἐπικηρύξας**, D10 under **ἔπαλξιν**, D13 under **καὶ τὸν μὲν δοῦλον**, D16 under **Τοὺς δ' ἀχρείους**, D18 under **Μὴ φανερός**, D20 under **Αὐτός**, D26 under **ποιοῦ**, D27 under **Καὶ θόρυβον**, D68 under **παρακάλει**, D70 under **Ἁλισκομένης**. Otherwise, consult the Index of Passages Cited s. v.

11 For a survey of the miscellany of works which fall under this head see D.F. Sullivan, 'Byzantine military manuals: prescriptions, practice and pedagogy', in P. Stephenson (ed.), *The Byzantine World* (London & New York 2010) 149–161.

12 P. Rance, 'The date of the military compendium of Syrianus Magister', *BZ* 100 (2007) 701–737, with lavish bibliography and discussion (cf. in brief D. Whitehead (ed.), *Apollodorus Mechanicus: Siege-Matters* (*Historia* Einzelschriften 216: Stuttgart 2010) 18 n.7); I. Eramo, 'Sul compendio militare di Siriano Magister', *RSA* 41 (2011) 201–222.

13 H. van den Berg, *Anonymus de obsidione toleranda* (Leiden 1947); D.F. Sullivan, 'A Byzantine instructional manual on siege defense: the *de obsidione toleranda*. Introduction, English translation and annotations', in J.W. Nesbitt (ed.), *Byzantine Authors, Literary Activities and Preoccupations: texts and translations dedicated to the memory of Nicolas Oikonomides* (Leiden 2003) 139–266 (including a reprint of van den Berg's text).

14 R. Schneider, *Griechische Poliorketiker mit den handschriftlichen Bildern herausgegeben und übersetzt, II: Anweisen zur Belagerungskunst* (*Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen, philologisch-historische Klasse*, neue Folge 11 no.1: Berlin 1908 [1909]).

15 D.F. Sullivan, *Siegecraft: two tenth-century instructional manuals by "Heron of Byzantium"* (Dumbarton Oaks Studies 36: Washington DC 2000). Analogously to what Diels-Schramm did

198.7 Wescher[16] = 1.8–18 Sullivan) does not, as transmitted, include the name of Ph., but editors have posited a lacuna in which, after the mention of Apollodorus, Athenaeus and Biton, it could well have featured. For Ph.'s name does occur, twice: as 'Philo of Athens' (reproducing Athenaeus's slip: see above) in 212.11–12 = 12.1–2, at the start of a section (212.11–214.3 = 12.1–25) where the writer presents ideas, drawn from Ph., on opportunistic besieging tactics (D2–4 [*96.28–37*], D73 [*102.12–19*]); and as 'Philo of Byzantium' at 260.5 = 48.1, which introduces Ph.'s D11 [*97.30–34*] (filler tortoises with "rafts") and D74–75 [*102.19–27*] (wall-climbing techniques). In other places, too, it is either certain or probable that our Ph. is the source of unattributed material here. See, principally:

203.2–4 (= 3.43–46), *re* B31 [*88.25–31*] and B40 [*89.8–10*];
204.8–18 (= 4.4–15), *re* (D6 [*96.42–49*]), D9 [*97.9–19*], D18 [*98.13–17*] and D26–27 [*98.45–99.3*];
207.12–16 (= 8.1–5), *re* D36–37 [*99.29–37*];
209.3–212.10 (= 11.1–29), *re* A76 [*85.22–29*], D10 [*97.19–30*], D30 [*99.11–13*], D32 [*99.18–19*], D39 [*99.41–44*] and D43–44 [*100.2–11*];
259.1–13 (47.1–14), *re* D11 [*97.30–34*] and D35 [*99.26–28*];
261.3–10 (= 49.1–9), *re* C65 [*95.39–44*] and A79 [*85.35–39*];
276.15–17 (= 58.8–10), *re* D111 [*104.40–42*].
Appendix 3 presents these nine *Par:Pol.* passages.

(B) THE WORK AND ITS AUTHOR[17]

As will already be evident, the 'work' of Ph. which is my concern here formed part of a larger whole. At *Bel.*56.13 he uses a phrase which, when capitalized, has been regarded as its overall title: *Mêchanikê Syntaxis* (Μηχανικὴ Σύνταξις), *Engineering Compendium*. In that same sentence he refers back to its *Introduction* (Εἰσαγωγή), and elsewhere in *Bel.* two other, substantive components are mentioned, as neuter plurals: *Mochlika* (Μοχλικά), *Matters of Leverage*, in 59.18–19 and 61.21–22; *Limenopoiika* (Λιμενοποικά), *Harbour-construction*, at the very start of *Bel.* in 49.1–3, with the implication that it is the topic immediately preceding *Bel.* itself. Thus, the scholarly consensus is, we see Ph.'s first four volumes in order of appearance; three lost ones and the surviving *Bel.*[18] Thereafter the element of conjecture

with Ph., Sullivan divides the *Par:Pol.* into 58 short chapters, each with their own line-numbers, and adds Wescher page numbers (unaltered by Schneider) in the margin. I cite by both systems.

16 See the asterisked footnote in Conventions and Abbreviations.

17 A recent encapsulation, brief but expert, of what follows here is P. Rance, 'Philo of Byzantium', in R.S. Bagnall et al. (ed.), *The [Wiley-Blackwell] Encyclopedia of Ancient History* (Malden MA 2013) 5266–5268 (and on line).

18 Besides the annotated translation of *Bel.* in Marsden, *Treatises* 105–184, see J.G. Devoto, *Philon and Heron: artillery and siegecraft in antiquity* (Chicago 1996) 4–94; and latterly M.J. Schiefsky, 'Technê and method in ancient artillery construction: the *Belopoeica* of Philo of Byzantium', in B. Holmes and K.-D. Fischer (ed.), *The Frontiers of Ancient Science* (Berlin 2015) 613–651.

increases apace,[19] but conventionally placed next is a *Pneumatika* (on devices operated by heated air or fluids), which survives only in a heavily-interpolated Arabic version and a partial Latin translation of another,[20] and then an *Automatopoiika* on the manufacture of mechanical toys and other amusements.

It is after these two lost treatises that Ph.'s recommendations for siege-warfare are nowadays routinely located. Once regarded as a single piece of writing – a position also taken by Garlan – in four parts first discerned by Rochas d'Aiglun (I–IV, followed by Schoene and Lawrence; A–D in Diels-Schramm, followed by everyone else, including me), it is more usually conceived as two halves: an initial *Paraskeuastika*, I–II/A-B, and a subsequent *Poliorketika*, III–IV/C–D. (Ph. himself appears to use the first of these titles, retrospectively, at D92.2 [*103.33*]. The second has no basis in the text but is simply a common-sense description of the topics covered.) Whatever view is taken of the internal organisation and description of this siege-related matter, however, the points of substantive importance are two. One is that Ph. begins (in A-C) by adopting the standpoint of the besieged community, before (in D) reversing the perspective to that of their assailants.[21] And the other is that what we can read of Ph.'s recommendations nowadays, under both heads, is a significant diminution of what he himself wrote. Diels and Schramm entitled it *Exzerpte aus Philons Mechanik B.VII und VIII*, and others have followed them. To my mind the term is (or at any rate might be) ambiguous, implying that selected matter has been transmitted in its full and original form –something which seems highly unlikely to be so. Rather, the impression left on the modern reader is that of a severe, even brutal, epitome or précis overall, with numerous lacunae along the way.[22]

After the poliorcetic coverage, in any event, there may have been a further volume of the *Syntaxis* (forecast in D82.2–4 [*102.48–50*]) devoted to cryptography, and other stratagems either included with it or treated separately.

Who then was the author of this compendious product?

Whether 'of Byzantium' by birth or by naturalization, Ph. cannot be safely identified with any other bearer of his commonplace name, so the meagre set of

19 I have nothing to add to the long-standing controversies in this area, which are well documented and summarized by Garlan 282–283 (and already in his 'Cités, armées et stratégie à l'époque hellénistique d'après l'oeuvre de Philon de Byzance', *Historia* 22 (1973) 16–33, at 16–18).

20 See F.D. Prager, *Philo of Byzantium, Pneumatica: the first treatise on experimental physics, western version and eastern version* (Wiesbaden 1974), whose translations I rely on here. I have not consulted the earlier editions by W. Schmidt (Leipzig 1899, part of his *Heronis Alexandrini opera*) and B. Carra de Vaux (Paris 1902).

21 Compare (but in reverse) book 3, on sieges, of Frontinus's *Stratagems*: sections 1–11 illustrate possible ploys for the attacking side, sections 12–18 do the same for defenders.

22 In this regard Garlan 286 notes, as have others, the sharp stylistic contrast between *Bel.* and the present material, with the latter frequently exhibiting an excessive degree of concision and/or confusing transitions. Garlan postulates, surely rightly, an editor/epitomizer of the early Byzantine period, perhaps the reign of Justinian; cf. W.M. Murray, *Age of Titans* 287 with n.14. (Contrast the fate of Apollodorus (Mechanicus) of Damascus, whose *Poliorketika* underwent not diminution but extensive enlargement in late antiquity; see generally Whitehead, *Apollodorus*.)

facts (and assumptions) about him are all drawn from the *Syntaxis* itself, and particularly from the *Belopoiika*. At *Bel.*51.15–23 he undertakes to recount what he has discovered by associating with *technitai* in Alexandria and *architektones* in Rhodes. Thereafter the name most frequently mentioned is that of Ctesibius (of Alexandria): 56.22–23, 67.43–45, 72.36–43, 77.15–17, 77.46–78.2. A phrase which occurs in the second of these passages, Κτησίβιον τὸν ἐν Ἀλεξανδρείᾳ γεγονότα (67.44–45), has given rise to an orthodoxy that he was no longer alive at the time when Ph. was writing,[23] but unwarrantably so in my opinion; the perfect participle γεγονότα, taken to show this, need mean only that Ctesibius had been born in Alexandria. (Compare e.g. Andoc. 1.127, ἐκ Χρυσίλλης γεγονότα, used of a living son of Callias.) It is not even certain that Ph. had encountered Ctesibius in person.[24] Nevertheless he seems to be a figure of the recent past. Consequently, since Ctesibius's *floruit* is nowadays placed in the second quarter of the third century, under the reign of Ptolemy II Philadelphus,[25] I find no call to question the modern orthodoxy which places Ph. himself in the second half of that century. Further precision than that seems out of reach.[26]

*

Ph.'s *Syntaxis* was written 'in the manner now familiar to us from Archimedes and Apollonius of Perge, that of the literary epistle, with the difference that the books were apparently wholly composed in the epistolary form, and not simply the introduction. They were all addressed to a certain Ariston'.[27] This generalization does appear to be sound, given the formulaic phrase 'Philon to Ariston, greetings', Φίλων Ἀρίστωνι χαίρειν, which opens both the *Belopoiika* (49.1) and, albeit garbled in the Arabic and Latin, the *Pneumatika*;[28] and it has been routinely supplied at the start of the poliorcetic material also, despite there being no express manuscript authority for this.

But who was Ariston? As with the name of the writer himself, identification is thwarted by the sheer number of its attested bearers. Of the ones proposed, arguably the most plausible is the one proffered by Lawrence, who cites Diodorus Siculus

23 Already in Graux 91; see also e.g. P.M. Fraser, *Ptolemaic Alexandria* (Oxford 1972) 2.623 n.446.

24 Fraser, *Alexandria* loc.cit. is insistent that Ph.'s allusion to Ctesibius's water-organ in *Bel.* 77.46–78.2 proves personal acquaintance, given that the device was 'described to him by Ctesibius'. However, Marsden (*Treatises* 153) translates the relevant phrase, ἐπεδείκνυτο δὲ ἡμῖν ὁ Κτησίβιος παραδεικνύων τήν τε τοῦ ἀέρος φύσιν κτλ. (77.46–48), as 'Ctesibius, it was explained to us, demonstrated the natural property of air etc.'. Roundly to declare Ph. a 'Schüler des Ktesibios' (Orinsky et al., 'Philon' 53; cf. Fraser, *Alexandria* 1.432, 434) is too bold.

25 So e.g. A.G. Drachmann, *Ktesibios, Philon and Heron: a study in ancient pneumatics* (Copenhagen 1948) 1 ff.; Marsden, *Treatises* 6–9; Fraser, *Alexandria* 1.428 (and 2.622–623 n.445); T. Rihll, *The Catapult: a history* (Yardley PA 2007) 140–147.

26 It is customary, nowadays, to assign Ph. a date of c.200, though Lawrence 71 has tried to place him in the 240s on the basis that he was prompted to write by the campaigns of Ptolemy III Euergetes, in the second half of that decade, which resulted in the conquest of Phoenicia and much of Syria.

27 Fraser, *Alexandria* 1.428–9.

28 On the dedication in the latter work see Prager, *Pneumatica* 46–48; the form of the name he prints (from the Arabic version) is Muristom.

3.42.1 for 'that Ariston who was despatched by Ptolemy ['almost certainly Ptolemy II': Lawrence] to investigate the coast of Arabia as far as the ocean'.[29] Lucianic agnosticism, though, looks like the sounder position.[30]

As regards a generic characterization: in view of the wide range of topics and disciplines covered by the *Syntaxis* as a whole, to envisage Ariston as a practical military man (whether as a commander of troops or on the engineering side)[31] seems to me less compelling than the picture conjured up by the opening of *Pneumatika*, that of an "armchair" theoretician and experimenter. 'Your interest in ingenious devices has been known to me. You say and urge that you want a book about them. I wrote it and send it gladly. May it be an aid to your studies of all these devices. Indeed such matters are worth the attention of learned men'.[32]

*

With no extrinsic information or insight able to be generated through identifying either the writer or his dedicatee, one is driven back to what is either stated in or can legitimately be deduced from Ph.'s text itself, when set in the general chronological and cultural context of Fraser's 'Ptolemaic Alexandria', even if that does not imply or necessitate his fixed domicile (and permanent writing base) there. The recollection in *Bel.* 51.19–23 of time spent in Rhodes (see above) is twice echoed by allusions to that city – which in themselves imply, without expressly claiming, autopsy – in this poliorcetic material: A17–18 [*80.45–51*], A59 [*84.5–8*].[33] Alexandria itself is not mentioned again here, though a passing allusion to Egyptians and their wall-climbing methods is (D75 [*102.23–27*]).[34] References to (?)Ake and Babylon (B53 [*90.14–24*]), for natural products occurring there, might suggest personal acquaintance with either or both of those places, though of course they do not have to.[35] All

29 Lawrence 73 (anticipated, in fact, by a comment *obiter* in Rochas d'Aiglun). An older alternative, less attractive because it belongs in a purely Sicilian context (Ariston Onasou, a general at Tauromenium in the late third century), is mentioned and discounted by Garlan 285 (where 'CIG' XIV 421 should read IG).

30 'Lucianic' because of the exchange between Lexiphanes and Lycinus in *Lexiphanes* 1: when the former announces that he has written a *Symposium* as a challenge to 'the son of Ariston', the latter replies 'there are many Aristons' (Πολλοὶ μὲν οἱ Ἀρίστωνες). Lacking the clue which nevertheless allows Lycinus to identify his friend's Ariston as the father of Plato, students of Ph. cite the passage purely for wit's sake: Graux 94; Fraser, *Alexandria* 2.620 n.427; Garlan 285 (and already in 'Cités' 19).

31 So e.g. F. Haase, 'Philon', in J.S. Ersch and J.G. Gruber (ed.), *Allgemeine Encyclopädie der Wissenschaften und Künste* 23 (1847) 428–435, at 429 n.13; Garlan 284–285; W.M. Murray, *Age of Titans* 129.

32 Prager's translation (*Pneumatica* 127).

33 On Rhodes in Ph.'s time see generally R.M. Berthold, *Rhodes in the Hellenistic Age* (Ithaca NY & London 1984); V. Gabrielsen, *The Naval Aristocracy of Hellenistic Rhodes* (Aarhus 1997); H.-U. Wiemer, *Rhodische Traditionen in der hellenistischen Historiographie* (Frankfurt 2001).

34 Note also the casual references to Egyptian artefacts in the *Pneumatika* (2, 6, 16, 60).

35 Another toponym, Megalopolis, might occur in A44.3–4 [*83.8–9*], but only if one can endorse the long and (in my opinion) dubious Diels-Schramm supplement for the lacuna there. See the Comm. thereto.

in all, the siege warfare toward which Ph. directs his recommendations probably needs to be visualized as taking place in what Lawrence calls 'the border-land for which the Ptolemies and Seleucids contended, over more than a century of alternate open war and uneasy peace': in broad terms, Palestine, Phoenicia and Syria.[36]

Whether Ph. was drawing on personal experience of such warfare is another matter. Readers of Aeneas Tacticus, his predecessor in the field, receive the distinct impression that *he* has suffered the travails of being under siege himself, in the sort of mid-fourth-century polis he is writing about (and for); perhaps that he has himself occupied a position of military authority and responsibility in such a place. By contrast one cannot feel at all certain that Ph. had ever had first-hand experience of what it was like to be under (or subject to) siege; nor that he was any kind of *vir militaris* in a practical, hands-on sense.[37]

Such indications as there are, indeed, positively suggest that he was not. Some of these are to be found in the *Belopoiika*, where one recent study comments, for example, that 'Philon's personal inexperience of catapult construction and use is evident in his reliance on other people's testimony when he gives his recommendations for the dimensions of the springs and arms of a palintone'.[38] In that highly technical field Ph. was a dilettante, someone absorbing a given subject via lectures and/or written treatises (by Ctesibius and others, in that instance); and what is true of artillery is likely to be true also of the wider range of topics covered in the poliorcetic material. To put the point bluntly: a civilian's life spent in Byzantium, Rhodes and, especially, Alexandria will not have required Ph. to build a city's fortifications (part A), arrange its food supply (part B), protect it from military attack (part C) or successfully prosecute such an assault (part D). And conversely, it is from the author of the *Pneumatica* that we are unsurprised to see a fanciful suggestion for ladders, too, activated by inflation (D73 [*102.12–19*]).

Of course, characterising Ph. as more of a theoretician than a practician of Hellenistic siege-warfare opens up possible avenues of its own into the intellectual content of his writings and the intellectual influences upon them. Heinrich von Staden has drawn attention to several facets of interplay between Ph. and the works of his contemporary Andreas of Karystos, court doctor to Ptolemy IV Philopator, besides noting that the vocabulary of Ph.'s detailed recommendations on nutrition in the besieged city (part B) is heavily indebted – probably via Andreas and his own teacher Herophilus – to Hippocratic treatises on the subject.[39]

36 Lawrence 70–71 (quotation from 70). A modern analytical narrative corresponding to this terrain is J. D. Grainger, *The Syrian Wars* (*Mnemosyne* Supplements 320: Leiden 2010). On the negative significance – in directing our gaze away from Balkan and Aegean Greece – of Ph.'s assumption that date-palms are likely to be available in his city (B1.7 [*86.27*], B48.5 [*89.42*], B52.7 [*90.14*], C3.2–3 [*91.4–5*], D10.6 [*97.24*] and D17.5 [*98.8*]), see the Comm. to B1 **πρὸς δὲ τοὺς φοινικικοὺς ἄρτους**.

37 On Aineias in this regard see already Whitehead, *Aineias* 34 (citing earlier assessments in the same vein). I did not compare Aineias with Ph. at that time, but doing so now leads me to dissent from (e.g.) W. M. Murray, *Age of Titans* 284 n.3, who writes of 'military men like Aeneas and Philo'.

38 Rihll, *Catapult* 163.

39 H. von Staden, 'Andréas de Caryste et Philon de Byzance: médecine et mécanique à Alexandrie', in G. Argoud and J.-Y. Guillaumin (ed.), *Sciences exactes et sciences appliquées à Alexandrie* (Actes du colloque international de Sainte-Étienne, 6–8 juin 1996). Publications de l'Université de Sainte-Étienne (Sainte-Étienne 1998) 147–172; Hippocrates point at 166 (with table II) there.

At more mundane levels Ph.'s reliance on pre-existing material is harder to fathom, beyond the fact (noted already) that he knew and used Aeneas; but what Ph. demonstrates even so is that it was possible to follow in Aeneas's literary footsteps without conveying much sense of real-life conflict.[40]

(C) STYLE, TONE AND TERMINOLOGY

For the purposes of this section it is particularly important to keep in mind that comment on what 'Ph.' does or does not do – in the poliorcetic material – can mean no more than what we find in this transmitted epitome.

'[W]ritten in the most vivid style … even more vivid than that of Aeneas Tacticus'. Peter Fraser's response to Ph.[41] strikes me as an unduly warm one, rather unlikely to be shared by most modern readers. The contrast with Aeneas, to the latter's disadvantage, is particularly puzzling on several counts, including the (apparent) fact that Ph. chose not to do[42] one crucial thing that Aeneas had so successfully done: to leaven what could otherwise have been a dead weight of didacticism, positive and negative, with specific historical instances, i.e. illustrating where the course of action in question had been either adopted with good results or ignored with bad.[43] If Ph.'s original had, in reality, included historical material of this kind, the summarizer has done us a signal disservice by jettisoning it. In any event, and setting aside any further stylistic comparisons with Aeneas, the fact of the matter with Ph. is that, whatever else he is, he is (in this work) no paragon of Greek prose style. Rather, he says what he has to say in a businesslike manner: plain, often inelegant, and, especially for readers of large stretches of him at a time, repetitive – so much so, indeed, that most translators have felt impelled to introduce some degree of the syntactical variety that he himself, it seems, abjured.

His very opening sentence, it turns out, is a typical one (A1 [*79.1–7*]): Πρῶτον μὲν δεῖ τοὺς οἰκοδομοῦντας πύργους <καὶ τείχη> ὀρύξαντας μέχρι πέτρας ἢ ὕδατος ἢ τινος ἐδάφους ἀσφαλῶς τοῦτον ἀποστερεώσαντας τὸν τόπον ὡς μάλιστα τιθέναι τοὺς θεμελίους ἐν γύψῳ, ἵνα μὴ ἔνδον τῶν θεμελίων οἱ τοῖχοι ῥηγνύωνται μηδ' ὑπορύττηται τὰ τεῖχη. Here at the outset are the twin building-blocks of his mode of presentation: (*a*) the instruction itself and (*b*) the purpose (or result) of following it.

Element *a* is here conveyed by a δεῖ clause, and there will be 59 more instances of this. It is Ph.'s favourite didactic idiom (in this work: *Bel.*, a slightly longer one,

40 Aeneas, for instance, is never guilty of the sort of near-banality that Ph. lapses into (unless a summarizer is to blame?) at D58 [*100.50–101.2*].

41 Fraser, *Alexandria* 1.433.

42 Except in transitory passing at A17.1–2 [*80.45–46*] and A59.4 [*84.8*] (Rhodes), and D75.5 [*102.27*] (Egyptians).

43 See in brief Whitehead, *Aineias* 8; at length M. Pretzler, 'Aineias the historian', in M. Pretzler and N. Barley (ed.), *Brill's Companion to Aineias Tacticus* (Leiden & Boston 2016) chap. 4.

has just 18). He never uses χρή, to vary it. Instead, as in the sentence (A2 [*79.7–11*]) immediately following the one just quoted, δεῖ can be left implicit and the statement simply couched in one or more present infinitives (οἰκοδομεῖν in this instance) that it governs. Hanging participles, like κατασκευάζοντας in A3.2 [*79.12*], sometimes prolong or elaborate the instruction.

In addition Ph. has a small repertoire of other ways of expressing what must or should be done. By far the most common of these, with 49 instances, are gerundive verbal adjectives used impersonally (e.g. ποιητέον in A11.2 [*80.20*]). Other impersonal modes include: third-person imperatives, both singular (e.g. ἀπεχέτω in A10.1 [*80.16*]) and plural (e.g. δεθέντων in A8.4–5 [*80.8–9*]). Something that does happen and is by implication recommended to happen can be expressed by present indicatives, in the third-person singular (e.g. ποιεῖται in A14.1 [*80.32*], συντελεῖται in A15.2 [*80.34*]) or third-person plural (e.g. ἔχουσι in A17.2–3 [*80.46–47*], ἐκτίθενται in A29.3 [*81.49*]), or future indicatives, again singular (e.g. ἔσται in A44.8 [*83.14*], B55.4 [*90.31*] and C23.6 [*92.45*]) or plural (e.g. ἔσονται in A17.4–5 [*80.48–49*] and A65.1–2 [*84.28–29*]). There are also miscellaneous idioms such as ἁρμόσει ('it will be fitting': A5.1 [*79.20*]), προσήκει ('it is appropriate': B30.1 [*88.20*]), συμφέρει ('it is advantageous': B48.1 [*89.38*]), and the five occurrences of ὀρθῶς ἔχει (A84.1 [*86.3*], B1.1 [*86.21*], C3.2 [*91.4*], C32.1–2 [*93.25–26*], C34.2 [*93.33*]), which I translate 'it is good practice'. (*Bel.* has no such instances of ὀρθῶς ἔχει, so I am inclined to think this might be a summarizer's chosen way of expressing himself, not Ph.'s own.)

Greater intimacy – at least notionally – with the recipient Ariston is expressed, here and there, by future indicatives in the first person plural (e.g. οἰκοδομήσομεν in A20.1 [*81.6*]) or by second-person singular imperatives, present (e.g. ποιοῦ in D6.5 [*96.46*], D12.1 [*97.34*], D24.4 [*98.37*], D26.1 [*98.45*]) or aorist (e.g. ἐξοικοδόμησον in B20.3–4 [*87.39–40*]).

Element *b* usually follows *a*, but for exceptions see e.g. A8.1–5 [*80.5–9*], B19.1–5 [*87.32–36*]. It is characteristically a ἵνα-clause, of which there are no fewer than 82 instances. (By contrast, *Bel.* has just two.). Clauses with ὥστε-plus-infinitive do serve as an occasional variant, and the same function can be performed by the alternative means of an explanatory clause with γάρ. Overall, though, one feels bound to suspect that Ph.'s original called upon a much greater variety of expression in these statements of purpose or result than the summarizer thought necessary to retain.

Given that the latter's role was this quintessentially negative or reductive one, little can be safely said about the positive side of Ph.'s stylistic and tonal preferences. We might note the frequency with which it is asserted that the rationale of adopting this or that piece of advice is to make something happen 'easily';[44] since, however, in *Bel.* Ph. never once says such a thing, here again, perhaps, is an idiom – and a mentality – that can be attributed to a summarizer rather than to his original.

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44 See for this (usually adverb, occasionally adjective) A10.2 [*80.17*], A13.4 [*80.31*], A25.3 [*81.36*], A33.3 [*82.16*], A50.5 [*83.34*], A51.4 [*83.37*], A80.2 [*85.40*], A82.4 [*85.49*], B29.4 [*88.19*], C7.5 [*91.23*], C14.9 [*92.4*], C39.3 [*94.3*], C65.6 [*95.44*], D3.3 [*96.33*], D81.2 [*102.46*].

Within this rather dour didactic framework, the substance of what Ph. originally had to say about siege warfare is transmitted in vocabulary which has caused his translators and commentators numerous headaches. I am no exception.

'Many people feel the multiplication of words to be a curse, and yet it is remarkable how many obscure matters become simplified once enough words are invented so that it is possible to refer to things which are different by words which convey the difference'.[45] Though Scranton was referring to present-day vocabulary (for masonry styles), his dictum is one that many would endorse, and apply to other circumstances. Scholars are reckoned to share with technical writers, whether modern or ancient, a wish for verbal precision which, if successfully realized, can compensate readers and users of their work for shortcomings in the area of style and general literary elegance. Sometimes, though, precision is not attained by such writers – and sometimes they leave the reader in doubt as to whether precision, of this kind, has even truly been at the forefront of their aims.

Is Ph. a case in point? Here are the views on this matter taken by two of my predecessors, Graux and Lawrence.

Graux, in 1879, declared that

> Philon emploie plusieurs mots qui ne sont pas jusqu'ici expliqués comme il faut dans les lexiques, et plusieurs autres dans des sens qui ne sont consignés ni au *Thesaurus*, ni ailleurs. Nous avons donc été obligés d'avancer pas à pas, en rédigeant nous-mêmes notre lexique au bas de chaque page. Ces notices lexicographiques aideront à interpréter sainement des centaines de passages ordinairement mal compris chez les écrivains grecs dans leurs récits de siège. Signalons seulement, pour donner ici même une idée des résultats auxquels on arrive, le double sens de mots comme: Βέλη, qui veut dire, tantôt *projectiles*, tantôt *machines de tir*; Πετροβόλοι, Καταπάλται, etc., qui se prennent également bien pour les machines dites *balistes*, *catapultes*, etc., et pour les *projectiles* que ces machines envoient.

This realization that some terms in Ph. bear a dual (or multiple) sense is an important one, plainly, when technical terminology is in play. But of equal importance is the same issue in reverse: when different words are used, do they consistently convey different meanings?

A. W. Lawrence first formulated some views about Ph.'s vocabulary for a paper delivered to the Cambridge Philological Society in February 1945, a summary of which was published in the Society's *Proceedings* the following year;[46] however, it was half a lifetime before this saw print again, in fuller form and as applied to the actual translation of those sections of Ph. that Lawrence included in *Aims*. His approach to, and stance on, this matter can be judged from the following extracts from his 'Rules followed in translating':[47]

> Contemporaries with the requisite training thought, no doubt, that Philo had generally succeeded in his aim of writing clear, terse statements, but his extreme brevity on technical matters caused difficulties even to Byzantine readers and now invites diverse interpretations […]

45 R. L. Scranton, *Greek Walls* (Cambridge MA 1941) 45.
46 A. W. Lawrence, 'Terms expressive of direction in Philo Mechanicus (summary)', *PCPhS* 178 (1941–1945) [1946] 25.
47 Lawrence (*Aims*) 72.

> The 'Wall', τεῖχος, of a city is distinguished by the initial capital from any lesser wall, τοῖχος. Although Philo's two words for a stone-projector, πετροβόλος and λιθοβόλος, are on occasion used interchangeably (e.g. III [= C] 67–68 [*95.49–96.8*]), he appears generally to reserve the former for heavier types; it, too, is differentiated in the translation by 'Stone-projector' with initial capital, while λιθοβόλος is rendered 'stone-projector' with a small initial letter.
> It would be misleading to give literal equivalents for words that Philo habitually uses in a technical sense. So καταπέλτης is translated as 'bolt-projector', βέλος (when <not> applied to a missile)[48] as 'catapult', μηχάνημα as 'mobile-tower'. […] Circumlocution cannot be avoided for ὄρθιος and πλάγιος, terms which as a rule describe respectively a direction at right angles to the general frontage and a direction parallel to it.

My own position, overall, on translating what Ph. writes about (i) fortification(s) and (ii) machinery may be summed up as follows.

(i) Fortification(s)

Abstract nouns. Either two or three are used – πυργοποιία, τειχοποιία, τοιχοποιία – and almost always (whether in singular or plural) used in the sense of a specific mode or scheme of fortification, not the generic topic of fortification-building. (The point is worth making because the only one of these terms attested earlier than Ph. does denote the generic topic: τειχοποιίαν ἢ σκηνοποιίαν ἢ ἄλλην τινὰ πρᾶξιν in Aen.Tact. 8.3.) For πυργοποιία see A39.1 [*82.43*], A85.2 [*86.12*] (pl.), A87.2 [*86.19*] (pl.) and B23.1–2 [*87.47–48*] (pl.). For τειχοποιία see A45.1 [*83.15*], A53.2 [*83.43*] (pl.), A55.2 [*83.48*], A59.2 [*84.6*] (pl.), A69.1 [*84.43*] (pl.) and A84.1 [*86.3*] (pl.). (D88.3–4 [*103.21–22*] uses the term τειχοποιία in a looser way, meaning little more than τείχη.) The solitary passage where editors since Schoene have all concurred in printing τοιχοποιία is A25.1 [*81.34*], Τοιαύτης δ' οὔσης τῆς τοιχοποιίας κτλ, but I am not convinced that this *hapax legomenon* can stand.[49]

Is any substantive distinction being made between πυργοποιία, τειχοποιία, and (for those who accept it) τοιχοποιία? That question, perforce, is closely related to – though not necessarily provided with a simple answer by – another one: what, in Ph., is denoted by τεῖχος, τοῖχος, and πύργος?

Walls. The very opening sentence of the work refers to both τοῖχοι (masculine) and τείχη (neuter), and thereby invites the reader to believe that they refer to different things: foundations must be securely set in mortar 'in order that the τοῖχοι be not shattered inside the foundations and the τείχη be not undermined' (A1.5–7 [*79.5–7*]). Languages like Latin, French and German, with a plurality of words for 'wall', can conveniently deploy it in a context like this: thus *murus* and *paries* (Vitruvius), *die Wände* and *die Mauern* (Diels-Schramm), *les murs* and *les murailles* (Garlan). Lacking such a solution in English, Lawrence, as quoted above, adopted a typographical mode of differentiation. However it be presented in translation, the normal differentiation is, clearly enough, between the macrocosmic enceinte as a

48 I have supplied the negative which, surely, this parenthesis needs.
49 See further in the Comm. to A25 **Τοιαύτης**.

whole[50] – singular τεῖχος or plural τείχη used indiscriminately, it seems[51] – and (usually plural) τοῖχοι which (usually) refer to the faces or sides of their constituent elements such as towers or "curtains" but also to the walls of other, non-fortification structures like granaries (B10.2 [*87.3*], B12.2 [*87.14*], B14.2 [*87.21*], B15.2 [*87.22*]) and houses (C23.4 [*92.43*]).[52] (For a triangular, subsidiary counter-wall termed a τεῖχος see C18.1–2 [*92.22–23*].) I translate τοῖχος/τοῖχοι as 'side/sides' whenever it is appropriate to do so; just a few places require alternative translations or explanatory parentheses.

Towers. Since Ph. seems never to refer to a movable siege-tower (on which see below, under Machinery) by the noun πύργος,[53] we can be sure that the πύργοι to which he does, frequently, refer are stationary architectural structures. In almost every instance 'tower' (*tour*, *Turm*) is the natural and unproblematic translation, and I adopt it.

An exception has been claimed in the very first sentence, where the phrase τοὺς οἰκοδομοῦντας πύργους (A1.2 [*79.2*]) is rendered 'die, welche Befestigungen bauen wollen' by Diels-Schramm and 'les constructeurs des fortifications' by Garlan. In my opinion such a broad sense of πύργος, appearing this once but never again, is unsatisfactory, and if one agrees (as not all do) that something more than 'towers' is called for in this context there is a good case for a textual supplement.[54]

On the basis of this assessment of what 'walls' and 'towers' mean in Ph., we can return to the issue of how best to translate the related abstract nouns on the dozen occasions they occur. Though the almost complete separation between the sense(s) of τείχη and the denotation of πύργοι is noteworthy, little or no differentiation in context is discernible, despite it, between a τειχοποιία[55] and a πυργοποιία. I can see nothing to be gained by allocating them to different English words, therefore, and instead use 'fortification-system' for both.[56]

50 Maier 2.81 observes that in inscriptions κύκλος is not attested, with this meaning, outside Athens; note, nevertheless, ἂτ τοῖ τείχεος κύκλου [= Attic κύκλῳ] μὲς πὸτ τὸν Μιρούνδαν in line II.61 of SEG 43.311, the wall-survey from Hellenistic Skotoussa (**Appendix 4**), referring to part of the enceinte. (Ph. himself does use the noun but in other, more general senses.)
51 In A37.2 [*82.33*] and C40.2 [*94.7*] the variant τείχισμα occurs, for no obvious reason; I do not differentiate it in translation.
52 Cf. Garlan 331.
53 For possible exceptions see the Comm. to C8 **<εἰς> σῶληνα** and C57 **Ἐὰν δέ**.
54 See the Comm. to A1 **τοὺς οἰκοδομοῦντας**.
55 With which can be associated the rare cognate verb τειχοποιῶ in A58 [*84.3–5*], on encampments: Τὸν αὐτὸν δὲ τρόπον καὶ ἐν τοῖς στρατοπέδοις τειχοποιητέον ἐστίν, ἐὰν προσδέχηται πολιορκίαν τινά.
56 I have not seen H. Tréziny, 'Le prix des murailles', in J.-P. Brun and P. Jockey (ed.), *Τέχναι. Techniques et sociétés en Méditerranée: hommage à Marie-Claire Amouretti* (Paris 2001) 367–380, but, as reported in SEG 51.1410, the classical-period evidence he studies there includes (at 367–372) the 17 tablets which record loans made for πυργοποιία and ὀχύρωσις ('strengthening') in the archive of the Olympieion at Lokroi Epizephyrioi, dating from the second half of the fourth century or the first half of the third. On the basis of literary and epigraphical evidence for the costs of πύργοι elsewhere, Tréziny argues that the amount of money earmarked for πυργοποιία in tablet 12 is too high for it to have been used for tower-building alone; rather, for an entire fortification.

Other fortification vocabulary in Ph. can be more briefly surveyed.

The inter-tower sections of a city's wall – conventionally its curtains/*courtines*/*Kurtine* – are referred to by two very similar neuter nouns: μεταπύργια (fifteen instances, all but three of them plural) and μεσοπύργια (five instances, all plural). As a general point LSJ s.v. reckons them simple equivalents. A writer like Ph. who employs both words – most strikingly in the same sentence (in A7 [*79.26–80.5*]) – is either doing so for simple variety's sake or in order to convey some kind of objective difference, but no such difference seems detectable here.[57] I translate both as 'curtains'.

The terms ἐπάλξεις (plural in all but one instance) and προμαχῶνες (always plural) appear to be used interchangeably. I give them the English equivalents of 'parapet(s)' and 'battlements', respectively, but if any substantive distinction was intended it is impossible to fathom. Alongside these are several instances – some of them, admittedly, with textual problems – of the noun βαρίς (or βᾶρις) familiar from the Septuagint and Josephus, and rendered here as 'bastion'. These terms and others are discussed in the Commentary to the passage where they first appear.

Ph.'s vocabulary for the various extra-mural constructions and other elements that he recommends is largely unproblematic, though again, where that is not so the problems are aired in the Commentary. Singular or plural *proteichismata* I translate in the traditional way by 'outworks', but occasionally I have departed from the standard equivalents. In particular, throughout this book, a *taphros* is a 'trench' (not the more orthodox 'ditch').

(ii) Machinery

The terminology applied to military machinery in Ph. is unsystematic. Considerable headway can be made in fathoming it, but it resists complete rationalization, and in point of fact one should not, in my opinion, seek to impose in every translated instance 'a spurious definiteness absent from the Greek'.[58]

(*a*) *Artillery*.[59] First, as already noted (via Graux and Lawrence), no clear differentiation is made between the weapons themselves and the ammunition they fire. With regard to βέλη, the commonest term throughout, contexts which are certainly referring to projectiles – the default sense since Homer: see LSJ s.v. – call for just that translation: so e.g. A6.3 [*79.23*] (falling ones), B53.9 [*90.22*] (poisoned ones) and C72.2 [*96.16*] (ones removed from wounds). Conversely, in passages like A6.6 [*79.26*], A20.9 [*81.14*], C1.3 [*90.48*], C18.5 [*92.26*], C70.2–3 [*96.11–12*], D9.2 [*97.10*], D12.5–6 [*97.38–39*] and D25.1 [*98.42*] my translation is the macrocosmic

57 Lawrence 73 claims to detect one in A7.4–5 [*80.3–4*] and C21.1–2 [*92.33–34*], where 'the translation [of μεσοπύργιον] assumes that he used it in a slightly different sense, to designate a curtain interrupted by an entrance at some distance from either tower'; Lawrence is content, though, to attribute μεσο- elsewhere either to Ph.'s inconsistency (cf. Maier 2.80 n.51) or to copyists' errors.

58 I borrow this splendid phrase from another context: Walbank in HCP 2.76 (referring to W.R. Paton's translation of the phrase διά τινος σχαστηρίας in Plb. 8.6.10).

59 On artillery in Ph. see generally Marsden, *Development* 113–115; Rihll, *Catapult* 161–163.

'artillery'. In many places, though, the difference is of scant significance and I use 'projectiles' wherever there is no positive reason not to do so.

Other Greek words, more precise in themselves, seem to do the same double service, e.g. πυροφόροι (used as a plural substantive: LSJ s.v. 1); contrast e.g. C12.2 [*91.41*] with C58.3–4 [*95.19–20*].

As to type/function, abstract theory[60] starts from the noun καταπάλτης and sees it qualified by one of two adjectives (which can also function as independent substantives, with καταπάλτης implicit or forgotten): ὀξυβελής for machines designed to fire sharp-pointed bolts or darts, and λιθοβόλος or πετροβόλος for those – developed later – which propelled spherical stones or rocks. All four of these terms appear in Ph., and he is even obliging enough, once (B49.4–5 [*89.49–50*]), to use the "textbook" phrase ὀξυβελεῖς καταπάλτας, but aside from that his most noteworthy habit in this area is always to use unqualified *katapaltai* in the sense of *oxybeleis*: A20.9 [*81.14*], A21.2 [*81.16*], C26.2 [*93.2*], C30.5 [*93.15*], D31.4–5 [*99.16–17*].[61] Simply in order to reflect the Greek I translate as 'catapults' in those five instances (and B49.4–5 [*89.49–50*]), with 'bolt-firer(s)' used elsewhere.

When it comes to Ph.'s *petroboloi* (27 occurrences) and *lithoboloi* (20 occurrences), we have seen that Lawrence, while conceding a degree of interchangeability between the two words, sought to suggest that a *petrobolos* was typically the heavier-calibre weapon of the two – and rendered by him with a capital letter accordingly: *petrobolos* = 'Stone-projector', *lithobolos* = 'stone-projector'. This fails to convince, in my view. Not only are there passages like the one noted already, C67–68 [*95.49–96.8*], where both terms are used of the self-same equipment, but in D31.5–6 [*99.17–18*] a very small machine of this type is referred to as a *petrobolos*.[62] In keeping the two terms distinct in translation – *lithobolos* as 'stone-projector, *petrobolos* as 'rock-projector' – I am therefore, here again, merely reflecting the stylistic variation of the Greek.[63] In one instance the context seems to require *lithoboloi* to be men, not machines.[64]

Mention should also be made of the neuter noun ὄργανον. Ph. had already used it much in the *Belopoiika*, where it refers, expressly or by implication, to artillery. In the present, more wide-ranging and less specialized work its scope extends at one point to mean medical instruments: C72.3 [*96.17*]. The other four instances all appear to concern artillery (explicitly in C6.4–5 [*91.18–19*] and C67.3 [*95.51*]; unspecified military equipment in B49.6 [*89.51*] and D8.6 [*97.6*]), but I retain the broadness of the Greek by translating 'engine(s)'.

60 Latterly adumbrated by W.M. Murray, *Age of Titans* 145.

61 The definition is established in contradistinction to *lithoboloi/petroboloi* in A20.9–10 [*81.14–15*], A21.2–3 [*81.16–17*] and C30.5 [*93.15*], and by mention of the bolt-length in C26.2–3 [*93.2–3*] and D31.4–5 [*99.16–17*]; for the latter criterion see also D17.9–10 [*98.12–13*] (noun implicit).

62 Cf. W.M. Murray, *Age of Titans* 290 n.22.

63 Ph. is not, to be sure, unique in this respect: see Rihll, *Catapult* 85–86 on Diodorus Siculus's usage.

64 D66.1–3 [*101.31–33*], where I follow Garlan on this point: see the Comm. thereto.

(*b*) *Other machinery*. A miscellany of other poliorcetic equipment, used by the attacking side or the defenders or in some instances both, makes its appearance in Ph.'s recommendations. Some of this is described in terms unproblematic *per se*: so e.g. κριός ('ram') and its counterpart τρύπανον ('drill'), and the various kinds of χελώνη ('tortoise'), for filling, ram-carrying, and – as γερροχελώνη, 'wicker-tortoise' – troop-protection. Other items are either more obscure in themselves, such as the ἐνετήρ (C13.3 [*91.45*], D48.2 [*100.18*]), or referred to in terms which either might or must bear multiple meanings; στοά and τρίβολος, for instance, which I leave as transliterated forms. Whatever the case, this terminology is left for discussion in the Commentary to the relevant passages.

That leaves the issue of the word which, in this area, occurs more than any other: μηχάνημα.

As noted above, Lawrence regarded this as Ph.'s word for a mobile siege-tower, and translated it accordingly – thereby, as is obvious, converting a broad Greek noun into a much more specific English phrase. (This position was in fact anticipated by Rochas d'Aiglun: 'une *tour* de charpente élevée pour les opérations du siège, soit par la défense, soit par l'attaque'; my emphasis.) Other translators have adopted the opposite course, with a non-committal vagueness which outdoes even Ph.'s own: 'ouvrage de charpente' (Garlan), 'timber construction' (W. M. Murray).

Finding fault with these solutions is easier than improving on them oneself. By a process of elimination as much as anything else, Ph.'s μηχανήματα – always plural, indeed, except in C8.2 [*91.26*], C15.6 [*92.13*], C64.1 [*95.36*] and C68.5–6 [*96.6–7*] – are likely to be πύργοι of some kind in nearly all instances. (For a probable exception see D12.3 [*97.36*].) That Ph. does not designate them as such,[65] when the word in this sense was long-established,[66] might be deemed eccentric. (It can scarcely be supposed that the summarizer(s) made a point of systematically expunging the term.) In any event Ph.'s apparent liking for something looser ought to be respected in translation, though preferably without the pedantry of some of the ones that have been suggested.[67] Diels-Schramm opt for 'Maschinen' (occasionally elaborated as 'Belagerungsmaschinen'). In English equivalent, I cannot better it.

(iii) *plagios* and *orthios*

Lawrence's realization, quoted above, about what these adjectives (and their cognates) frequently mean in Ph.[68] can in most instances be dealt with by resort to some degree of circumlocution, as he recommended. Where this is intended to be self-

65 Two possible exceptions are noted above, under Fortification(s)

66 See e.g. Xen. *Cyrop.* 6.1.53–55 (previously referred to as μηχαναί), 6.2.18.

67 W. M. Murray, *Age of Titans* 290 claims merit in the fact that his and Garlan's periphrases draw attention to construction from, largely, wood rather than metal; but that point would hold good for all such equipment, not only towers.

68 Frequently rather than invariably: sometimes *orthios* and *orthos* describe things standing vertically upright (A37.3 [*82.34*], A76.3 [*85.24*], B14.2 [*87.21*]).

explanatory I have provided no expansion in the Commentary, but see the discussions at A11 **τιθέντας**, A17 **ὧν οἱ τοῖχοι**, A41 **Ἁπάντων** and C23 **ἐκ τῶν πλαγίων**.

(D) THE BESIEGED COMMUNITY IN AENEAS TACTICUS AND PHILO

In a seminal article of 1973 (serving, in part, as prolegomena to his edition, with translation and commentary, which appeared the following year) Yvon Garlan drew attention to many of the insights that Ph. can give into the Greek city of his day.[69] A generation on, it seems appropriate to assess the data again – if somewhat differently – and at the same time to essay something that Garlan did only sparingly: a comparison of the evidence furnished by Ph. with that of his predecessor Aeneas.

To be sure, juxtaposing Aeneas and Ph. is no simple matter of comparing like with like. In respect of *time*, a gap of more than a century separates them. Aeneas's treatise is datable (by every evidential test, positive and negative, one can apply) to the mid-point of the fourth century.[70] He is a writer of the high classical period, displaying no Hellenistic pre-echoes except (arguably) in the area of language, which is not central to my concerns here. Ph. belongs to the latter part of the third century, and that is a fact of significance not merely in the passage of time but the advent of monarchic superstructures and other changed background circumstances. As regards *place*: irrespective of Casaubon's famous suggestion that Aeneas is the Arcadian general, from Stymphalos, who has a walk-on part in Xenophon's *Hellenica* (7.3.1), Aeneas's world was the "old" world of Balkan Greece and the Aegean.[71] Ph.'s is that of the eastern Mediterranean, with its cultural epicentre in Ptolemaic Alexandria. (Even in the era in question, therefore, the extent to which Ph.'s city can be understood as 'Greek' is not the same as Aeneas's had been.) And a third relevant issue is *extent of survival*: much material that would have been pertinent to the comparison is missing, on both sides.[72]

69 Garlan, 'Cités'.

70 See e.g. Whitehead, *Aineias* 4–13; Bettalli, *Enea* 3–6.

71 Whitehead, Aineias 10–13; Bettalli, *Enea* 5–6; and most recently R. Lane Fox, 'Aineias the author: who, where and when?', in Pretzler and Barley chap. 2 (tracking him across a wider span of that 'world' than previous investigators).

72 For Aeneas's *Procurement* (Ποριστικὴ βίβλος: 14.2) and, especially, *Preparation* (Παρασκευαστικὴ βίβλος: 7.4, 8.5, 21.1, 40.8) see Whitehead, *Aineias* 13–17; Bettalli, *Enea* 10–12. From Ph.'s side, the lost *Harbour-construction* (Λιμενοποιικά) is not comparable with anything in Aeneas, whose own treatment of naval matters, touched on only briefly and sporadically in what survives, was set to begin in earnest just where the transmitted text breaks off (40.8); see P. de Souza, 'Raiders from the sea: the maritime context of the *Poliorketika*', in Pretzler and Barley chap. 10. In the category of topics treated in Aeneas and Ph. alike but only extant at length in the former, there belongs, accordingly, a single item: secret messaging. In Aeneas the long and celebrated ch.31 is devoted to this; see D77 under **Γράφονται**. Ph. intended to go one better: after giving some examples, he declares that he will describe others 'in the (?)section about messages being sent secretly' (D82.3–4 [*102.49–50*]); but just as with Aeneas's mention of an *Encampment* (Στρατοπεδευτικὴ βίβλος: 21.2) as something not yet written, it is unclear from this solitary allusion whether Ph.'s intention was carried though.

All these provisos need to be kept in mind – as does the more subjective point that Aeneas's first-hand, practical experience of his subject[73] is not matched by anything discernible in Ph. Nevertheless, Ph. demonstrates that it was possible to follow in his predecessor's literary and didactic footsteps without conveying much sense of real-life conflict; and on a conceptual level it will now be seen that a collation of their evidence is illuminating.[74]

(i) The Polis

First and foremost, it needs to be – and it can be – established that the 'siege' warfare addressed by Aeneas and Ph. alike had at its heart something which, as a rule, was no mere fortress or purely military stronghold but a fully-rounded civilian community which happens to be under attack; in short, a polis.

Aeneas has occasion to mention, *exempli gratia*, eighteen specific places to which he applies, directly or indirectly, the term πόλις.[75] This roster can be rounded up to twenty by adding 18.8, where the name of a polis in or near Achaia seems to have fallen out of the text, and 40.2, where Aeneas himself chooses to withhold a toponym. What is more important to note, though, is that a generic polis context is established at the very outset of the treatise, in the first sentence of its Preface (survivors of unsuccessful foreign expeditions can still return to their own 'chôra and polis and patris'); and this is endlessly reiterated thereafter, from 1.1 (troop dispositions should be made in the light of 'the size of the polis and the topography of the asty') onwards. Inevitably, given the nature of Aeneas's subject-matter, a topographical sense of the term πόλις predominates.[76] As a rule there are no great difficulties in separating out, from the larger group of passages where a polis is something physical and tangible,[77] the smaller group where the term has its intangible "political community" sense.[78]

Ph., as transmitted, has no scene-setting Preface, but launches straight into the first of his chosen themes, on systems of fortification. Nor does his *modus scribendi*, as preserved, follow Aeneas's lead of illustrating (and in the process enlivening) the didactic material with concrete examples, whether positive/approbatory or negative/cautionary. Thus, in the entirety of the work as we have it, very few particular places are mentioned by name – and none of those mentioned is characterized as a polis.[79] Nevertheless, in Ph. just as in Aeneas, a general polis context is all-pervasive. For the first occurrence of the word itself one has to wait until A16.3 [*80.43*] (a casual allusion to enemies being (un)able 'to break into the polis', εἰς τὴν πόλιν παραπεσεῖν), but there are forty more instances thereafter – plus one of *polisma*, used in a sense indistinguishable from polis (A84.6–7 [*86.8–9*], τὸ πόλισμα ὅπου δεῖ κτισθῆναι; compare οὕτως ἡ πόλις ᾖ ἐκτισμένη in D6.1 [*96.42*]).

The context of A16.3 [*80.43*] makes it clear that 'the polis' there means the urban centre, inside its circuit-wall.[80] Like Aeneas, above, Ph. uses the less ambiguous word asty only once. In D3 [*96.31–33*] he asserts that 'it is by intercepting most people outside the polis that you might most easily capture the asty' (πλείστους γὰρ ἔξω τῆς πόλεως ἀπολαβὼν ἀνθρώπους ῥᾳδιέστατ' ἂν λάβοις τὸ ἄστυ); there the two words are evidently synonyms, so that again, clearly, 'the polis' means 'the town'. A polis vs. chôra dichotomy is explicit in A78.3–4 [*85.34–35*] ('to convey into the polis whatever is requisite out of the chôra', κομίζειν εἰς τὴν πόλιν ὅσα προσῆκον ἐκ τῆς χώρας; cf. D87.2 [*103.17*] for the enemies' chôra seen from the attackers' perspective), but even without such a pointer it is plain that Ph.'s 'polis' is, overwhelmingly, a physical entity: a walled and (C30.1–2 [*93.11–12*]) gated town or city. Even so, here too the abstract/political sense is occasionally what he has in mind. For this see B30.1–2 [*88.20–21*] ('the polis' should lay down at least a year's

73 So e.g. Oldfather et al., *Aeneas* 4; Whitehead, *Aineias* 34 (with other references there).

74 As a general background point for the facts and figures that now follow, note that Ph.'s treatise as transmitted is approximately two-thirds the length of Aeneas's. I defer detailed comment on passages in Ph. to the Comm.

75 Abdera (15.8–10), Apollonia Pontica (20.4), Argos (11.7–10, 17.2–4), Barke (16.14), Chalkedon (12.2–4), Chalkis (4.1–4), Chios (11.3–6), Herakleia Pontica (12.5), Himera (10.22), Ilion (24.4–14), Klazomenai (28.5), Kyrene (16.14), Megara (4.8–11), Naxos (22.20), Plataiai (2.3–6), Poteidaia (31.25–27), Syracuse (10.20–21), Teos (18.13). M.H. Hansen, 'Aeneas Tacticus', in M.H. Hansen (ed.), *The Return of the Polis*. (Papers of the Copenhagen Polis Centre, 8) *Historia* Einzelschriften 198 (Stuttgart 2007) 243–245 has a shorter 'list of poleis' (with brief comments appended on the sense(s) of the term polis in each case) than this; however, under 'Appendix: attestations of polis used in the political sense' he adds Barke, Herakleia and Kyrene, and he might have added Syracuse, which Aeneas proffers in 10.21 as an instance of the advice (10.10) to remove leading malcontents 'in the polis'). Beyond that I would suppose that, for Aeneas, any place he cites by way of illustration (e.g. Corcyra in 11.13) is one he regarded as a polis, and is presenting as one. In any event Hansen and I are in full accord on the point central to my purposes here: that Aeneas's approach is polis-driven from start to finish. (Hansen notes 148 attestations of the word itself.)

76 In the case just cited, 1.1, a differentiation between asty (the sole instance of the term in the treatise, though see sub-section v below for *astoi*) and polis might require the latter to be construed in a territorial sense, i.e. the agricultural land as opposed to the urban centre. (So, without argument, Hansen, 'Aeneas' 243.) For the opposite of this, 'polis' as a synomym for asty, see e.g. 8.2 ('the harbours in the chôra and in the polis'), 15.9 (the Triballians lay waste the chôra of Abdera 'not far from the polis') and 17.2 (an Argive festival held 'outside the polis of the Argives'). On the other hand Aeneas's regular term for the community's land is indeed its chôra (32 instances, beginning in the very first sentence), so for that and other reasons it may be preferable to understand the phrase 'the size of the polis', τὸ μέγεθος τῆς πόλεως, in 1.1 as 'grandezza della città, sopratutto in realizione al numero dei suoi abitanti' (Bettalli, *Enea* 213; cf. Whitehead, *Aineias* 99). Either way, the passage is unusually opaque.

77 To these may be added the three instances of the diminutive *polisma* (2.2 *bis*, of Sparta; 24.8, of Ilion), a word associated with asty (see IACP 47–48) though not, or not necessarily, a simple synonym for it.

78 Generic examples of the latter include 3.1 (an *asyntaktos polis*), 10.11 (embassies coming 'from poleis or tyrants or armies'), 10.12 (importing foodstuffs that 'the polis' lacks), 10.23 (a polis gives hostages), and 12.4 (a polis employs mercenaries). For non-generic ones see already above, n.75.

79 For (?)Ake and Babylon see B53.3–5 [*90.16–18*]; for Rhodes, A17.1–2 [*80.45–46*] and A59.4 [*84.8*].

80 On walls see below, under sub-section iii.

stockpile of grain), C72–73 [*96.15–26*] ('the polis' should furnish doctors with what they need to treat wounded combatants), and arguably D15.3–4 [*97.51–98.1*] (stasis 'in the polis').

(ii) Natural Features

Aeneas and Ph. both make provision for poleis with ready access to the sea, without necessarily assuming that each and every community in question will be a maritime one.

In Aeneas, as noted above, a direct approach to naval matters is about to begin just where the surviving text breaks off, in the enigmatic 40.8 (Ναυτικοῦ δὲ στρατεύματος δύο εἰσὶ στόλοι …), but, already before that, the topic has arisen in passing. Conditional terms are used in 16.13 ('if boats are available', keep your troops fresh by pursuing the enemy by sea) and 16.21–22 (what to do 'if you have a fleet'). By contrast, 8.3 seemingly takes it for granted that both the chôra and the polis (*qua* town) will have harbours as well as sandy and rocky shores; 10.12 recommends rewarding importers and shipowners (*nauklêroi*); 17.1 refers to the need for watchfulness during a community's *neôlkiai* (ship-beachings or -dockings); and 29.12 appears to envisage, as a matter of course, vessels arriving and anchoring, and advises that 'the' harbour-guardians and despatch-officers should inspect their cargos – Sikyon's failure to do so on one occasion[81] being cited as the cautionary example.

In Ph.it is much the same, albeit (and despite the separate *Limenpoiika*) at greater length. Garlan declared that Ph.'s polis 'est supposée se situer au bord de la mer et posséder un port "fermé", c'est-à-dire inclus dans le périmètre fortifié, et dont l'entrée, simple ou double, peut être aisément barrée par les chaînes de fer'.[82] The material Garlan cites in support of this scenario does satisfactorily support it (C52–57 [*94.40–95.17*], D21–23 [*98.24–34*], D101 [*104.1–6*]), and one could augment it with, most notably, B52.5–7 [*90.12–14*], where poleis are advised to keep stocks of shipbuilding timber and oars. Furthermore, in secondary corroboration of a maritime/coastal environment there are contexts in Ph. which casually take as read the availability of seaweed (A76.3–4 [*85.24–25*], B52.4 [*90.11*], C4.2 [*91.10*]), sea-water (C13.1–2 [*91.43–44*]) or – as used by the attackers – sponges (D34.5 [*99.25*], D77.5 [*102.35*]). Nevertheless, due weight should also be given to D5.2 [*96.38*], where, just as in the two Aeneas passages noted above, a conditional element comes in: 'if the polis is by the sea, etc.'.

As regards other natural facets of landscape and topography, neither writer presupposes anything out of the ordinary. Inside the town, both Aeneas's polis and Ph.'s has an akropolis.[83] Outside it, Aeneas assumes (e.g.) that there will be rivers

81 In 369: see Whitehead, *Aineias* 182–183; Bettalli, *Enea* 299.
82 Garlan, 'Cités' 20.
83 Aen.Tact.: 1.6 (used figuratively), 22.19 (associated with a tyrant) and 29.1. Ph.: B48.2 [*89.39*] and D71.2 [*102.4*].

(1.2, 8.1), Ph. that there might be (D8.7 [*97.7*], ἐὰν ᾖ ποταμὸς πλησίον); and fresh water in other forms gets a mention.[84] Though there is no equivalent in Ph. of Aeneas's list of 'danger-spots, strongholds, defiles, plains, commanding heights, ambush-points, etc.' (1.2), which for the most part make one visualize variably high ground, Ph. too is well aware – particularly in A30 [*82.2–5*], A84 [*86.3–11*], and the rest of the material on fortification-systems – that flat terrain cannot be taken for granted.

(iii) Man-Made Features

Of all the built structures in the communities catered for by Aeneas and Ph., obvious primacy must be assigned to their circuits of defensive walls, the main physical obstacle to entry by hostile forces.[85] Only Ph., however, devotes space and effort to the matter of how such walls should best be designed and constructed.

For Aeneas, the presence of circuit-walls is simply taken for granted, from 1.2–3 onwards. Sporadic allusions throughout the bulk of the treatise give way, in 32–40, to a scenario of siege/blockade proper in which they are actually under attack, but even there he feels no need to recommend anything about them as physical constructs. (A brief exception occurs in 40.1: in circumstances where the city is large but the number of men defending it small, he advocates raising the wall-height at vulnerable points.) By sharp contrast, Ph.'s very first topic, addressed at length (A1–87 [*79.1–86.21*]), is *teichopoiia*. Under that head he discusses several basic models of fortification-design, and has a lot to say not only about the walls themselves but also the towers and other architectural elements associated with them.

Concerning what is inside the walls, both writers give glimpses of the mix of public buildings and private housing that their poleis typically display; and they also (and more importantly) reveal something of the intrastructure underpinning them.

Aside from the casual background of temples, shrines and other religious focal-points (and the activities associated with them) which is in play throughout each treatise,[86] Aeneas alludes to specific public buildings more often than Ph. does. A generals' office (*stratêgion*) features in both writers,[87] but only Aeneas mentions its civilian counterpart(s), *archeia* (22.2 & 4, and 29.10 on the *archeia* in a specific but

84 See e.g. Aen.Tact. 8.4 on 'standing waters' (στάσιμα ὕδατα), which probably include the natural as well as the man-made; Ph. A36.1–2 [*82.28–29*] and D10.9 [*97.27*] allow for a situation in which ground is 'subject to inundation' (ὑπομβρος).
85 Hansen and Nielsen, *Inventory* 135–137 assess 'City Walls as Evidence for Polis Identity' in the archaic and classical periods. Their main finding is that by the fourth century 'not to be protected by walls was both exceptional [known exceptions include Elis and Sparta] and regarded as old-fashioned … a defence circuit had become an indispensable part of the town'.
86 Aen.Tact.: Preface 2, 10.15; cf. 31.15–16 (extra-mural), and material on named poleis (2.2 Sparta; 17.3 Argos, again extra-mural; 17.5 Chios). Ph.: A86 [*86.13–18*], B48.3 [*89.40*], and (both extra- and intra-mural) D2–4 [*96.28–37*]. On religion see further below, subsection ix.
87 Aen.Tact.: 22.3. Ph.: D71.2–3 [*102.4–5*].

unnamed city); and only in Aeneas's polis can one be certain of the presence of a theatre – viewed from his special perspective as a rallying-point with associated open ground (1.9, 3.5, 22.4). Indeed, in Aeneas and Ph. alike, public areas of the town are significant as much for their empty space, free of buildings, as for the buildings themselves. Thus they both have precautionary points to make about an agora – Aeneas the more copiously[88] – and generically they both write of 'broad/wide places', in Greek either feminine *eurychôriai* or the rarer neuter *eurychôra*. Aeneas in 1.9–2.1 urges that these be watched over by those members of the citizen militia not selected for sentry-duty on the walls, or else, to forestall their exploitation by would-be revolutionaries, be made inaccessible with trenches. 2.1 then gives an instance of the Spartans adopting the latter course of action, successfully, against a Theban invading force,[89] and 2.7–8 counters in general terms the possible objections to such a strategy (regarded again as primarily directed against internal strife).

Ph., for his part, may have mentioned *eurychôriai* in A30.3 [*82.4*], but only the late manuscripts have it, in what is a lacuna (αἱ <…>ρίαι) in the earlier ones; Garlan prints his own conjecture αἱ <εὐθυω>ρίαι, which I accept. In any case the context there is a technical one, concerning an aspect of circuit-walls. A similar point applies to A32.5 [*82.10*], where singular *eurychôria* is used in an abstract sense (in connection with artillery-emplacements); however, at C24.2 [*92.47*] he not only switches to neuter plural *eurychôra* but means by it the same thing that Aeneas had meant. Ph.'s recommendation there is that houses adjoining or near the *eurychôra* should have holes pierced in their walls, for the thrusting of javelins etc. into enemy troops as they pass by.

Of the internal shape and organisational structure of the town in these two treatises, glimpses (as stated above) do appear.

In Aeneas the prime material on this topic takes up the two parts of his ch.3. First, in a scenario where a military emergency arises in a community which is not already on a war footing, the sub-divisions of relevance are declared to be the 'tribes' (*phylai*); each of them must guard a section of the circuit-wall and also supply able-bodied men for duty in the agora and on patrols and wherever else they may be needed (3.1–3). Oldfather and his colleagues in the Loeb edition translated phylai here as 'wards' but in 11.7–11 (episodes from the history of Argos and Pontic Herakleia) as 'tribes'.[90] It is not clear that such a distinction is warranted, i.e. that in 3.1–3 a φυλή is something to be envisaged as a territorial (or territorially-based) entity.[91] Rather, three indications to the contrary could be cited: that the wall-guarding duty is assigned at random (κλήρῳ: 3.1), not by proximity to a territorial tribe's notional area; that guarding a fort by allied troops is offered as an analogy (3.3); and

88 Aen.Tact.: 1.9, 3.2 & 5, 10.15, 22.2 & 4, 26.1, 30.1–2, and cf. 2.4 (Plataiai), 4.3 (Chalkis), 11.14 (Corcyra), 17.5 (Chios), 29.6 (unnamed). Ph.: D71.2 [*102.4*]. (Garlan, 'Cités' 20 adds D61.2 [*101.12*], which stretches a point: that passage merely uses the verb *exagorazein*.)

89 In 362: see Whitehead, *Aineias* 102; Bettalli, *Enea* 218–219.

90 Oldfather et al., *Aeneas* 37 and 67, respectively.

91 So already Whitehead, *Aineias* 104.

that 3.4–6 then proceeds, in a contrast with what has gone before, to recommend that a territorial (or topographical) system of peace-time civil defence be already in place.[92] This is based on the ῥύμη (rhymê). The term has already made a casual appearance in 2.5, in the description of the Theban attack on Plataiai (in spring 431): wagons are used to block 'the diodoi and the rhymai'. But it is now brought centre-stage as a tactical unit – or what can become such – with its own commander (3.4–6):

> (3.4) First, appoint the most competent and judicious men in each rhymê to be rhymarch, around whom everyone can rally if anything untoward happens during the night. (3.5) The rhymarchs of the rhymai nearest to the agora should lead their men into it, those of the rhymai nearest the theatre into it; and all the other rhymarchs should assemble at the open spaces nearest to them, with the men who have reported to them under arms; (3.6) in this way the members of each unit can arrive at their proper locations while remaining very close to their own homes, etc.[93]

What, then, is a rhymê? LSJ s.v., II, has 'street' – an understanding of the word which would allow Aeneas 2.5 (above) to be rendered 'the alleyways and the streets' of Plataiai.[94] Elsewhere, such rhymai are referred to so sparingly by classical-period writers as to make their precise nature opaque, but the situation becomes somewhat clearer if Hellenistic comparanda are brought in. Polybius, for instance, uses the word (and on one occasion the compound abstract noun rhymotomia, 'division by rhymai'), throughout his celebrated description of the internal organization of the Roman military camp (Plb. 6.24–42). Walbank was right to insist that the term itself applies there to the thoroughfare itself, not the block of tents pitched between one 'street' and another,[95] yet even so, both there in Polybius and also, more importantly, here in Aeneas, it seems legitimate to conceptualize a rhymê as 'una realtà urbanistica ormai scomparsa, propria, ancora in età moderna, delle città orientali: una via, o anche une serie die vie che formino un quartiere, il cui accesso sia controllato per mezzo di porte che durante la notte rimangono chiuse'.[96] Aeneas, to be sure, says nothing about any such gates – but Ph. does, in a passage which, as Garlan realised, furnishes the necessary parallel with the present one. Rather than rhymê, Ph. uses the term amphodon (and the cognate amphodarch), but otherwise it

92 N.F Jones, *Public Organisation in Ancient Greece: a documentary study* (Philadelphia 1987) 309 conflates 3.1–3 and 3.4–6 when he states that '[e]ach phyle was to be responsible for its section [*sc.* of the wall] and was to be under the leadership of a ῥυμάρχης ("street-commander")'. Aeneas makes no connection between the phylai and the rhymai, and none should be assumed. On the rhymai and their commanders see further below.

93 Aen.Tact. 3.4–6: (4) Πρῶτον μὲν ῥύμης ἑκάστης ἀποδεῖξαι ῥύμαρχην ἄνδρα τὸν ἐπιεικέστατόν τε καὶ φρονιμώτατον, πρὸς ὃν, ἐάν τι ἀπροσδοκήτως νυκτὸς γένηται, συναθροισθήσονται. (5) Χρὴ δὲ τὰς ἐγγυτάτας ῥύμας τῆς ἀγορᾶς εἰς τὴν ἀγορὰν ἄγειν τοὺς ῥυμάρχας, τοῦ δὲ θεάτρου τὰς ἐγγυτάτω ῥύμας εἰς τὸ θέατρον, εἴς τε τὰς ἄλλας ἕκαστον ἐγγύτατα εὐρωχωρίας ἀθροίζεσθαι τοὺς ῥυμάρχας μετὰ τῶν ἐξενεγκαμένων παρ᾽ αὐτοὺς τὰ ὅπλα· (6) οὕτω γὰρ ἂν τάχιστα ἔς τε τοὺς προσήκοντας ἕκαστοι τόπους ἀφίκοιντο καὶ ἐγγυτάτω τῶν σφετέρων οἴκων εἶεν, κτλ.

94 So already Whitehead, *Aineias* 47, and cf. Bettalli, *Enea* 69 ('i passaggi e le strade'). Contrast 'the streets and alleys' in Oldfather et al., *Aeneas* 33, i.e. seemingly envisaging the diodoi as bigger. The point is not central to my purposes here.

95 HCP 1.713.

96 Bettalli, *Enea* 221; compare 'precincts' (Oldfather et al., *Aeneas* 37).

is clear enough that the subject is still essentially the same (C23–30 [*92.40–93.23*], here abridged):

> (C23) Also, battlements should be placed on appropriate houses near the wall, and gates should be provided for each end of the amphoda, and holes should be made (coming) out of the flanking (house-)sides, through which it will be possible to strike with javelins and lances and ox-piercing spits into the flanks of those forcing their way into the amphoda; (24) and the houses which stand next to the open spaces and are close to the amphoda are to be provided for likewise. […] (26) At public expense a ten-mina stone-projector and two three-span catapults are to be issued to each amphodon. […] (28) Suitable (arrangements for) night-watches and sentry-rounds are to be made […]. (29) To these (sentries) and to the amphodarchs it is necessary that passwords and password-supplements be given from the generals […]. (30) It is also necessary that the gates be kept closed, those of the city and those of the amphoda alike, in order that if any of the enemy who have broken into the city at night or by day should rush down and capture certain places, they would first suffer badly when struck by catapults and stone-projectors, as well as by arrows and by stones from all directions, and after that the citizens and troops would issue forth from the night-watches and the amphoda and bring help; in formation and under command they would fall upon the enemy when they saw an opportunity, and were they to fail in something, they would be in a position to withdraw to a safe place because (our forces) are holding the gates of the amphoda.[97]

A reasonable judgement on all this, I believe, is to to say that what Aeneas describes is a rudimentary (or prototype) version of what Ph. describes. The similarities are plain to see, but so are some differences; Garlan's 'identique' overstates the case.[98]

One difference lies in the fact that Aeneas's rhymarchs are to be appointed for the job he intends them to do, whereas Ph.'s casual mention of 'the' amphodon-commanders seems to presuppose that they exist already. But beyond that, as regards this urban infrastructure itself, the rhymai do not demonstrably have all the formality of the amphoda. In particular, given Aeneas's keen interest in gates and matters pertaining thereto (chs. 5, 18–20, 28, and *passim*), he would surely have mentioned the gates of rhymai if indeed a town's quarters, in his day, had routinely had them. From Ph.'s advice on amphoda the opposite inference, for his time and place, is there to be drawn.

97 Ph. C23–30 [*92.40–93.23*], abridged: (23) Ἐπιθετέον δέ ἐστι καὶ ταῖς καθηκούσαις πρὸς τὸ τεῖχος οἰκίαις προμαχῶνας καὶ τοῖς ἀμφόδοις ἑκατέρωθεν πύλας κατασκευαστέον καὶ ἐκ τῶν πλαγίων τοίχων ὀπὰς ποιητέον, δι' ὧν τοῖς τε ἀκοντίοις καὶ ταῖς ζιβύναις καὶ τοῖς βουπόροις ὀβελίσκοις ἔσται τύπτειν εἰς τὰ πλάγια τοὺς εἰς τὰ ἄμφοδα βιαζομένους· (24) καὶ τὰς ἑσταμένας οἰκίας πρὸς τοῖς εὐρυχώροις καὶ τοῖς ἀμφόδοις ἐγγιζούσας ὁμοίως κατασκευαστέον ἐστίν. […] (26) Δημοσίᾳ τε εἰς ἕκαστον ἄμφοδον δοτέον ἐστὶν λιθοβόλον δέκα μνῶν καὶ καταπάλτας δύο τρισπιθάμους. […] (28) Ἐκκοιτίας τε καὶ ἐφοδείας τὰς προσηκούσας ποιητέον […]. (29) Τούτοις δὲ καὶ τοῖς ἀμφοδάρχαις συνθήματα καὶ ὑποσυνθήματα παρὰ τῶν στρατηγῶν δίδοσθαι δεῖ […]. (30) Δεῖ δὲ κεκλεῖσθαι τὰς πύλας καθάπερ καὶ τὰς τῆς πόλεως καὶ τὰς τῶν ἀμφόδων, ἵν' ἐάν τινες τῶν πολεμίων νυκτὸς ἢ ἡμέρας ἐμβαλόντες εἰς τὴν πόλιν παρεμπέσωσιν καὶ καταλάβωνταί τινας τόπους, πρῶτον μὲν τοῖς καταπάλταις καὶ τοῖς λιθοβόλοις, ἔτι δὲ <τοῖς> τοξεύμασι καὶ τοῖς λίθοις πάντοθεν τυπτόμενοι κακὰ πάθωσιν, μετὰ δὲ ταῦτα ἐκφοιτῶσι καὶ βοηθῶσιν οἱ πολῖται καὶ στρατιῶται ἐκ τῶν ἐκκοιτιῶν καὶ τῶν ἀμφόδων συντεταγμένοι καὶ ἡγεμόνας ἔχοντες ἐπιτιθῶνταί <τε> τοῖς πολεμίοις ὅταν ὑπολαμβάνωσι καιρὸν εἶναι, καὶ ἐάν τι διασφάλλωνται, ἔχωσιν εἰς ἀσφαλὲς ἀποχωρεῖν ἐχόντων τῶν ἀμφόδων πύλας.

98 Garlan, 'Cités' 22.

(iv) Women, Children and Families

Unsurprisingly for most ancient writers, let alone writers on military topics, the default central characters in both Aeneas and Ph. are adult males. A family setting does, however, show through from time to time.

In Aeneas this happens almost from the outset, in the second sub-section of his Preface. Appeal is made there to defence of 'the fundamentals' (τὰ μέγιστα), immediately glossed as 'shrines and fatherland and parents and children and so on' (ἱερῶν καὶ πατρίδος καὶ γονέων καὶ τέκνων καὶ τῶν ἄλλων). To modern eyes this list is perhaps striking as much for the element it leaves out – wives – as for the ones specified,[99] and it might be tempting to conjure a picture of a disagreeably male-chauvinist Aeneas out of this passage and the much-cited 40.5, which wraps up a mini-narrative from the (?)370s:

> (40.4) When the people of Sinope found themselves dangerously short of men during their war against Datamas, they disguised and equipped the most physically suitable of their women to make them look as much as possible like men, giving them jugs and similar bronze utensils in place of shields and helmets, and promenading them on the side of the wall where they were in fullest view of the enemy. (40.5) They were not allowed to throw, however: a woman throwing is recognizable a long way off.[100]

It would be anachronistic, though, to complain too much of condescension in that closing remark, which for him (if not necessarily for us) was a simple matter of fact.[101] From the perspective he is taking, Aeneas himself will have seen the cardinal point as being the availability of women who could be mistaken at long distance for men; and consequently the episode invites comparison with the one recounted in 4.8–11 (from sixth-century Athens), where Peisistratus's counter-attack against Megara involves choosing, from 'the Athenians' women' who had been celebrating the Thesmophoria at Eleusis, 'those of the women best suited to accompanying a naval expedition' (τῶν γυναικῶν τὰς ἐπιτηδειοτάτας συμπλεῦσαι). Here again their role is passive, concerned with creating a false impression (4.11). Another story involving women (and children) in a piece of deception, in Ilion, occurs in 24.7. For Aeneas, then, the default vulnerability of women, just as of children (and the elderly), is what comes through, both in the anecdotal/illustrative material – in 2.6 they take refuge, with slaves, on the Plataian rooftops – and in his general advice and recommendations. Women exposed to especial danger are fleetingly brought to mind in 31.7, where it is suggested that secret messages can be hidden in (or as) their earrings, but otherwise Aeneas's assumption is that a man's womenfolk and children will be, and indeed should be, under his protection. This, for instance, is

99 For instances (from Homer onwards) of this theme which do mention wives see Whitehead, *Aineias* 98.

100 Aen.Tact. 40.4–5: (4) Σινωπεῖς δὲ πρὸς Δαταμᾶν πολεμοῦντες ἐπεὶ ἐν κινδύνῳ ἦσαν καὶ σπάνει ἀνδρῶν, τῶν γυναικῶν τὰ ἐπιεκέστατα σώματα μορφώσαντες καὶ ὁπλίσαντες ὡς ἐς ἄνδρας μάλιστα, ἀντὶ ὅπλων καὶ περικεφαλαίων τούς τε κάδους καὶ τὰ ὁμότροπα τούτοις δόντες χαλκώματα, περιῆγον τοῦ τείχους ᾗ μάλιστα οἱ πολέμιοι ὄψεσθαι ἔμελλον. (5) Βάλλειν <δὲ> οὐκ εἶων αὐτάς· πόρρωθεν γὰρ κατάδηλος βάλλουσα γυνή.

101 See the commentary in Whitehead, *Aineias* 206.

the declared aim (or outcome) of his idea, already discussed in sub-section iii, that the rhymarchs and their men should muster as close to their homes as possible – 'close enough to maintain domestic control of those who have remained there, their children and wives' (3.6). It is also reflected in his belief that gatekeepers 'ought to be well-to-do individuals, with something at stake in the community – children and a wife, I mean' (5.1). And children, if not wives, feature as objects of pathos in 10.23–25; there Aeneas's advice is that if a city under siege has given hostages to its attackers, their parents and close relatives should be either sent elsewhere or at least kept *hors de combat* and under surveillance, in case their distress leads to subversion or collusion.

Pickings in this area are significantly leaner from Ph. Why?

Part of the answer must be the absence, in Ph., of the anecdotal/illustrative element. Beyond that, he simply has so much less to say about non-male matters. Two passages in part C may be noted nevertheless. In C31 [*93.23–25*], with enemy forces inside the town, Ph. writes that everyone involved should play a part in attacking them, including, from the roof-tops, 'the children and the slave-women and the (free) women and the girls' (οἵ τε παῖδες καὶ αἱ δοῦλαι καὶ αἱ γυναῖκες καὶ αἱ παρθένοι). This recalls Aeneas 2.6 on the Peloponnesian-War siege of Plataiai, mentioned above, where in fact Aeneas's source, Thucydides (2.4.2), makes an aggressive intent – well-attested elsewhere too – explicit. C47 [*94.26–29*] addresses a different scenario, the death in combat of 'foreigners' (ξένοι), by which is meant mercenaries.[102] Besides lavish burial at public expense, any children or wives they leave behind, and who have evidently accompanied them, are to be solicitously cared for (πολυωρεῖν μὴ παρέργως). No precedent or parallel here in Aeneas, whose attitude to the mercenaries of his time and place is largely stick and no carrot (see further below, sub-section viii). Ph. lived in a much-changed world in this regard, and a mercenary's family as well as the soldier himself could reap the benefit.[103]

(v) Animals

Military writers like Aeneas and Ph. see animals from a wholly utilitarian standpoint: their uses, direct and indirect, and any hazards that they might or will represent.

102 So Garlan, 'Cités' 24, reiterated Garlan 386.

103 On mercenaries in this era see generally e.g. G.T. Griffith, *The Mercenaries of the Hellenistic World* (Cambridge 1935); J.-C. Couvenhes, 'Les cités grecques d'Asie Mineure et le mercenariat à l'époque hellénistique', in J.-C. Couvenhes and H.-L. Fernoux (ed.), *Les cités grecques et la guerre en Asie Mineure à l'époque hellénistique* (Paris 2004) 77–113; A. Chaniotis, *War in the Hellenistic World: a social and cultural history* (Malden MA & Oxford) 78–93 and passim; N.V. Sekunda, '[Hellenistic] military forces', in P. Sabin et al. (ed.), *The Cambridge History of Greek and Roman Warfare, I: Greece, the Hellenistic World and the Rise of Rome* (Cambridge 2007) 325–356, at 343–344.

By 'direct' uses I mean use(s) in siege-related warfare itself, and Aeneas – who has much more to say than Ph. about animals generally – deals with four categories of animal under that head: equine above all, but also canine, bovine, and (briefly) apian/vespine.[104]

Concerning horses,[105] 6.6 allows for their presence conditionally: 'where the terrain is suitable for horses – and there are horses available – the best way of sending messages more quickly [*sc.* than on foot] is by relays or horsemen'. In a later context, 15.5, similar language is used when Aeneas is advocating deployment of 'the available cavalry and light-armed troops' (τοὺς ὑπάρχοντας ἱππέας καὶ κούφους) for reconnaissance and other duties. Since horse-friendly locations can also benefit an enemy's cavalry, he has already by then counseled, in 8.4, that they be rendered *anippa* (horse-free because horse-unsuitable); however no conflict between these two scenarios is acknowledged. 26.4, like 6.6, refers conditionally to a situation where a polis contains both horses and ground appropriate for their use, and the use proposed is mounted patrolling, but in a domain which has by now become restricted to the town itself.

Ph., in sharp contrast, never once mentions cavalry, or horses of any kind; nor does he offer any parallels at all for Aeneas's suggestions about ways in which other animals might be pressed into military service.

Dogs, Aeneas urges, should be tethered outside the walls on dark winter nights, so that they will bark at anyone who has no business to be either approaching or leaving the town, besides keeping the guards awake (22.14, with an example at 22.20; and see also 24.18); and this sort of thing is sufficiently well-attested elsewhere to guarantee its place in actual practice.[106] The potentialities of dogs as message-carriers is noted, again with examples, at 31.31–32. Aeneas is also alive, however, to situations in which dogs can cause trouble, and he is ready with ideas about how to prevent this. In 38.2–3 – by which time in his schema an enemy is already attacking the circuit-wall – the solution is simply to keep dogs (or perhaps only bitches: τὰς κύνας) tied up, but 23.2 counsels something more drastic: 'stop the dogs barking and the cockerels crowing: render them temporarily mute by cauterizing some part of their (?)mouth. This is because their cries, ringing out before daybreak, will reveal the plan [*sc.* of making an early sortie]'.[107] The propensity of either dogs or other creatures to make a noise, therefore, is only to be welcomed when it can be put to use – as when, analogously, his suggestion is that 'intoxicated heif-

104 This last refers to 37.1, an implicit rather than an explicit suggestion (couched in the form ἤδη δέ τινες καί with aorist, i.e. unspecified actual instances) about releasing wasps and bees into the enemy's tunnels.

105 Other than in the anecdotal material; for that, see 16.14–15 (chariots), 27.11, 31.8–9.

106 See Whitehead, *Aineias* 156–157; Bettalli, *Enea* 282; and add (e.g.) SEG 24.154, 41.76. Compare, in the same vein, Veget. 4.26.

107 Aen.Tact. 23.2: Τοὺς δὲ τῶν κυνῶν ὑλαγμοὺς καὶ τῶν ἀλεκτρυόνων τὰς φωνὰς ἀφανίζειν ἄφωνα ποιοῦντα τόνδε τὸν καιρόν, ἐπικαύσαντά τι τοῦ σώματος· καὶ γὰρ αἱ τούτων φωναὶ <πρὸ> ὄρθρου φθεγγόμεναι ἐκφαίνουσι τὸ μέλλον. Whitehead, *Aineias* 163 makes a case for emending the transmitted σώματος to στόματος. The phase 'their cries', αἱ τούτων φωναί, might refer only to the cockerels, but it would be uphill work, in this context, to prove so.

ers … and other draught-animals' be driven into the enemy camp to create alarm with their bells (27.14).

The mention of draught-animals (ὑποζύγια) there takes us from warfare proper into the more general realm of a community's use of livestock in wartime conditions. In Aeneas this topic is addressed most directly in 10.1: 'something which should already have been done is the issuing of an order, to those citizens who own draught-animals (ζεύγη) or slaves (ἀνδράποδα), to remove them for safe-keeping with the neighbours – given that they cannot be brought into the polis' (*qua* town). As has been noted,[108] Thucydides' description of the evacuation of Attica in preparation for the Peloponnesian War provides a perfect example of the first part, at any rate, of this: 'the flocks and the ὑποζύγια they sent across into Euboia and the adjacent islands' (Thuc. 2.14.1). In any event, Aeneas truly does seem to be contemplating (and advocating) the complete absence of draught-animals inside a town that is bracing itself for a siege or actually undergoing one – because, when he revisits the topic in later chapters, that is still the governing assumption. In 16.15 communities with 'a plentiful supply of ζεύγη' are advised to use them as troop-transporters; and in 28.1–3 the exhortation is to keep city gates closed and to admit ὑποζύγια and wagons – if their cargos are vital – only under escort. (28.5–7 and 29.7 tell cautionary tales of the fate of communities which have acted differently and regretted it.)

Ph. shares with Aeneas the realization that animals can sometimes be a nuisance. In his case the culprits are 'birds and … [unspecified] animals', which can find ways into a city's granaries and eat the grain, if not prevented from doing so by netting etc. (B10 [*87.2–8*]). But a more noteworthy passage, and in fact the only other context in which Ph. discusses animals directly, is D61–64 [*101.11–27*]. To grasp its import, what needs to be remembered is that in part D he is adopting the standpoint of the besiegers:

> (D61) Try, too, to remove the livestock that is inside (the city) <and> any draught-animals there may be. Either buy them up as cheaply as you possibly can or, seizing some plausible pretext in the truces which occur, let (the enemy) no longer (have to) drive in (the beasts) – by not guarding the places where they drive them out to pasture; rather, allow them outside grazing and then rush in or lay an ambush to cut them and take control of them. (62) For (the livestock) consumes nothing of what in useful in the siege, apart from chaff or hay, which serves no other purpose than fodder; (63) and it makes great contributions to health and nourishment because of both the milk and, when it is cut up and sold, the meat; (64) what is more, the skins are useful for the machines and the rams and suchlike.[109]

108 By Bettalli, *Enea* 235.

109 Ph. D61–64 [*101.11–27*]: (61) Πειρῶ δὲ καὶ τὴν ἔνδον οὖσαν λείαν <καὶ> ἐὰν ὑποζύγιά τινα ᾖ, παρελέσθαι, ἢ ἐξαγοράσαι ὡς ἐλαχίστου μάλιστα δύνῃ, ἢ ἐν ταῖς γινομέναις ἀνοχαῖς πρόφασίν τινα λαβὼν πιθανὴν μηκέτι εἰσελάσαι ἄφες μὴ φυλάσσων τοὺς τόπους τούτων ἢ ἐξελαύνοντες βοσκήσουσιν, ἀλλ' ἔασον αὐτοὺς ἔξω νέμειν καὶ ἔπει<τ' ἐπιδραμών> [τὴν ἐνέδραν] ἢ ἐνέδραν κατασκευάσας ἀποτεμόμενος κυρίευσον αὐτῶν. (62) Οὐθὲν γὰρ ἀναλίσκει τῶν ἐν τῇ πολιορκίᾳ χρησίμων ὄντων, ἀλλ' ἢ ἄχυρον ἢ χόρτον, οἷς εἰς οὐθὲν ἄλλο, εἰς δὲ τὰ βοσκήματα χρῶνται· (63) πρὸς ὑγίειαν δὲ καὶ τροφὴν μεγάλα συμβάλλεται διά τε τοῦ γάλακτος καὶ κατακοπέντων καὶ πωλουμένων τῶν κρεῶν· (64) ἔτι δὲ τὰ δέρματα αὐτῶν πρὸς τὰ μηχανήματα καὶ τοὺς κριοὺς καὶ ὅσα ἐστὶ τοιαῦτα χρήσιμα γίνεται.

This all sounds excellent advice, and advice that could profitably be taken by the besiegers of any community which had not followed Aeneas's recommendations (in 10.1: above) to remove its livestock for safe-keeping elsewhere. Some of what Ph. recommends in part D is the counterpart of ideas offered to the besiegers earlier in the treatise, but not (in what survives) this.

(vi) Slave, Foreigner, Citizen

In Aeneas and in Ph. alike, the space devoted to these three prime constituents of a polis's population reflects their positions in the status hierarchy, with non-citizens in general and slaves especially very much at the margins.

Anecdotes apart (2.6, 24.4, 31.28–29, 40.3), slaves feature in Aeneas only in ch.10.[110] First, in 10.1, comes the recommendation already mentioned in the preceding sub-section: that amongst the preliminary preparations against enemy invasion should be an instruction to the citizenry to lodge any 'draught-animals or slaves' they possess for 'safe-keeping with the neighbours – given that they cannot be bought into the city'. The word used there is the stark neuter plural *andrapoda*, and plainly Aeneas means by it slaves who both live and work in the countryside. Contrast 10.5, one of the martial-law proclamations that are to be issued later: if exiles are in the vicinity, an announcement must specify what is to be done with any of the '*astoi* or *xenoi* or *douloi*' who absconds to them; so there the assumption seems to be that slaves already based in the urban centre have stayed in it.

Ph., for his part, says nothing about evacuating an agricultural slave labour-force but he does, likewise, presuppose that there will be slaves inside the beleaguered city. Female slaves (*doulai*) join free woman and children as people who can harry invaders from the roof-tops (C31 [*93.23–25*], noted in iv above); and besiegers themselves are advised to announce that any deserving *doulos* will be freed (D13.1–2 [*97.41–42*]), to forestall the enemy arming 'the *metoikoi* and the *oiketai*' (D14.3–4 [*97.47–48*]). This obviously suggests that from the standpoint of the besieged he might have advocated precisely that,[111] but in what survives he actually does not. Rather, to reiterate, he holds out incentives to individuals for services rendered, whether they are slaves or metics; concerning the latter, D13.3–4 [*97.43–44*] advises besiegers to offer a crown to any 'metic hoplite' in the besieged city (τὸν δὲ ὁπλίτην μέτοικον στεφανώσειν) who has done something to deserve it. Thus, I would suggest, the *prima facie* conflict between D13 and D14 on this point is more apparent than real. The besieged will, very probably, arm their slaves and metics, or at least seriously consider doing so; the besiegers will try to thwart this, with or without success.[112]

110 D. Whitehead, 'L'image de l'étranger dans la *Poliorcétique* d'Énée le Tacticien', in R. Lonis (ed.), *L'Étranger dans le monde grec II: actes du colloque organisé par l'Institut d'Études Anciennes Nancy, septembre 1991* (Nancy 1992) 315–331, at 323–325.

111 Cf. K.-W. Welwei, *Unfreie im antiken Kriegsdienst, ii: die kleineren und mittleren griechischen Staaten und die hellenistische Reiche* (Wiesbaden 1977) 57–58; Whitehead, 'L'image' 327–328.

112 See further in the Comm. to those two chapters, and to C31.

Be that as it may, Ph. has no more to say about the free non-citizen denizens of this polis. (Foreign mercenaries are of course a different matter altogether.) Aeneas had done so, but – strikingly – in terms which reveal that they too, just like the slaves, are to be assigned no active role to play in his anti-siege strategy. Instead, insofar as he considers them at all, he does so as sources of potential hazard and insecurity, who must be subject to close control. 10.5 has already been noted in this connection: the martial-law proclamation designed to prevent contact between dissident exiles and any '*astoi* or *xenoi* or *douloi*'. There the broad term ξένοι can be assumed to embrace all those who are neither citizens nor slaves, i.e. all "civilian" foreigners of free status who are in the town at any given moment. Elsewhere, though, the terminology shows some differentiation, on practical grounds, between aliens *qua* visitors and those who are (or can be treated as) residents. The first of these scenarios is explicitly addressed at 10.9–10, on disarming and otherwise monitoring foreign visitors. The second occurs most clearly at 10.8, a stipulation that neither *astoi* nor *metoikoi* (Aeneas's sole use of the word) should leave by sea without identity-tokens, but it also colours 10.13–14: there, although the periphrasis ξένοι οἱ ἔνδημοι 'is not a synonym for metics, but all [free] non-citizens "in town" when the calls to arms are given',[113] the immediately-following reference to 'their' markets and shops necessarily picks out the resident component of the group.[114]

Beyond that, it is inevitably the citizens of these besieged poleis upon whom both Aeneas and Ph. focus the bulk of their attention. Aeneas calls them astoi, as we have seen, in 10.5 and 10.8, but politai elsewhere. Ph.'s citizen vocabulary is confined to politai.

In Aeneas, alongside their appearances in the anecdotal illustrative material (2.4, 17.3, 23.7–11, 28.5, 29.4), 'citizens' feature principally as the main category of people in the polis to whom his recommendations, directly or indirectly, apply. 'Guarding the politai' is the task of the military forces in Aeneas's city. The concept is expressed by a verb in 1.3 (τὰ δὲ τειχήρη καὶ πολιτοφυλακήσοντα *sc.* σώματα) and by its cognate abstract noun in 22.7 (τὰ περὶ τὴν πολιτοφυλακίαν); and one is bound to see, in the notion of 'guarding' there, the double sense of protecting the citizens from harm and also preventing any harm some of them might do themselves.[115] With the odd exception of 9.1, which appears to envisage 'soldiers' (στρατιῶται) and 'citizens' as simple alternatives to each other (for occupying extra-mural positions),[116] Aeneas's politai need to be understood, in point of fact, as filling multiple roles along a spectrum between the pure passivity implied by 1.3

113 Whitehead, *Ideology* 44, quoted with approval by Bettalli, *Enea* 243.

114 The Greek here is τούτοις τὰ ἐμπόρια καὶ πρατήρια κλείεσθαι, and in the Budé edition this is rendered by A.-M. Bon as 'les entrepôts et les marchés leur seront fermés'; but other translations, including my own, construe the dative as possessive.

115 Whitehead, *Aineias* 100; Bettalli, *Enea* 243.

116 Aeneas's phrase is 'having called an assembly of your own soldiers or citizens' (ἐκκλησιάσαντα τοὺς αὑτοῦ στρατιώτας ἢ πολίτας). Whitehead, *Aineias* 116 was wrong to deny that the στρατιῶται there could be mercenaries (as Parke, *Mercenaries* 95 n.1 had suggested); see rather Bettalli, *Enea* 234; and compare anyway 10.7.

ECOLE FRANÇAISE BIBLIOTHEQUE D'ATHÈNES

and 22.7 (above)[117] and the active military participation, albeit of a "civil defence" kind, outlined in ch.3.[118] Significant here is ch.12, where Aeneas stresses, with examples, the paramount importance of a polis's having more politai than any allies and/or mercenaries it involves in its defence. The reason for this is that in his opinion such aliens are by definition unreliable. Unfortunately (for him), he cannot count on all the citizens being any better in that regard; hence the sequence of positive and negative admonitions, which include identifying the most trustworthy citizens for talks with visiting embassies (10.11) and appointment as company-commanders of mercenary units (13.1), billetting the mercenaries with 'the wealthiest' citizens but only in tiny sub-sets (13.2–4), monitoring those citizens who are disaffected (11.1), and generally fostering unanimity (*homonoia*: 10.20, 14.1).

Ph.'s explicit references to citizens are sparser and, for the most part, more colourless.

In his long part A, on fortification, the subject-matter is so technical that one would not expect much politês-terminology, and only A76.1–2 [*85.22–23*] has it: pots are to be collected 'both from the citizens and at public expense' (παρά τε τῶν πολιτῶν καὶ δημοσίᾳ) for constructing, in front of the outermost ring of trenching, ground so weak that advancing enemy machines will be immobilized by it. But in part B, devoted mainly to foodstuffs, we get a glimpse of the extent to which 'those citizens who are affluent (*euporoi*)' will enjoy preserved meats in their diet (B2 [*86.27–32*]), and – in Ph.'s solitary instance of language of this kind – a suggestion for ensuring that 'our citizens' (ἡμῶν … οἱ πολῖται) do not go hungry during a siege (B31 [*88.25–31*]). Part C, on resisting siege, then introduces an Aeneas-like distinction between citizens and 'soldiers', with the former as well as the latter assumed to be taking an active military role (and citizens too poor to arm themselves armed at public expense: C27 [*93.3–4*]). For this bipartition see C2.1–2 [*90.49–50*], C18.5–6 [*92.26–27*], C30.7–8 [*93.17–18*], and especially C34 [*93.32–36*], where, just as in Aeneas, it is posited that some individuals in each category might be untrustworthy: οἷς ἂν ἀπιστῇς τῶν στρατιωτῶν ἢ τῶν πολιτῶν. Ph. has nothing to say (beyond B31, just cited) about how discontent in the citizen-body is to be avoided. He is, though, interested in how best to ensure the goodwill (*eunoia*) of the soldiers 'toward the generals and the citizens', and one of his suggestions to that end is that wounded soldiers be cared for by the citizens in their own homes (C45–48 [*94.20–31*]). Finally part D, contemplating siege-warfare from the aggressors' side, differentiates between stratiôtai and politai in a context which makes it clear that only the latter are on the receiving end of the blockade (D7 [*96.49–97.1*]); and the same is true of D70 [*101.42–102.2*], a scenario where the town is actually being captured and the behaviour of one's soldiers must not be allowed to alienate a citizen-body from whom services and levies (λειτουργίαι and εἰσφοραί) will soon be required.

117 In this vein see also 10.1 (announcements to politai) and the martial-law provisions of 10.5 and 10.8, which temporarily switch to astos terminology.

118 See already above, sub-section iii.

(vii) Constitution and Government

Given that Aeneas and Ph. alike are catering for a polis (above, sub-section i), the context of their recommendations necessarily envisages a community with some form of civic constitution in place and, as its practical expression, one or more sets of executive agencies. In both writers, nevertheless, these elements remain in the background.

As regards Aeneas, indeed, this is no accident. It is deliberate, hard-nosed policy, predicated on the idea that that, in the sort of emergency scenarios envisaged, restrictions will need to be placed on the normal functioning of civilian government.

This tone is struck as early as 1.4: 'so first one must pick out from them [*sc.* the soldiery] the men who are most judicious and have the greatest military experience, to be attached to the authorities'.[119] Just as, in 1.3, the notion of guarding the citizens carries the implication that they may have to be prevented from doing harm as well as from suffering it (see under the preceding sub-section), so too here, with the 'authorities' (ἄρχοντες), we see 'the dual notion of safeguarding and surveillance'.[120] And the anecdotal material subsequently underscores the range of hazards these office-holders can pose, from naive helplessness all the way to outright treachery: see in particular 2.4 (Plataiai), 4.11 (Megara), 11.3–5 (Chios), 18 *passim* (generic comment with illustrative episodes), 23.7–11 (unidentifiable). The point should not be overstated, for sometimes Aeneas's suggestions entail official actions or responsibilities with no implication that they will not be carried out efficiently and loyally (10.2, 10.4, 10.5, 10.7, 10.9–10, 13.3, 17.6). Yet even so it is hard to read the treatise as a whole, and the martial-law provisions of ch.10 in particular, without concluding that he feels at his most confident when the main lines of policy and procedure are determined by military command of some kind or kinds (see the next sub-section), with "peace-time" governmental practices – which even 10.4 sanctions: meetings 'in the prytaneion or in the council(-chamber) or in another public place' – limited to essential tasks.

By comparison with all this, Ph. evinces no overt distrust in the normal constitutional organs and agencies of his polis. He simply has little to say about them, directly. Here and there, even so, indirect glimpses are to be seen, and when they do occur they reveal nothing of Aeneas's jaundiced attitudes. An especially revealing passage in this regard is A86 [*86.13–18*]: 'it is also necessary to provide the tombs of brave men and multiple burial-places (in the form of) towers, in order both that the city may become more secure and also that those <who achieved distinction> in valour and those who died for their fatherland may end honourably buried in the fatherland itself'.[121]

119 Aen.Tact. 1.4: Πρῶτον μὲν οὖν αὐτῶν ἀπονεῖμαι δεῖ τοὺς φρονιμώτατους τε καὶ ἐμπείρους μάλιστα πολέμου, οἳ περὶ τοὺς ἄρχοντας ἔσονται.

120 Whitehead, *Aineias* 100.

121 Ph. A86 [*86.13–18*]: Δεῖ δὲ καὶ τῶν ἀγαθῶν ἀνδρῶν τοὺς τάφους καὶ πολυάνδρια πύργους κατασκευάζειν, ἵνα ἥ τε πόλις ἀσφαλεστέρα γίνηται καὶ οἱ μέν δι' ἀρετὴν <ἀριστεύσαντες>, οἱ δ' ὑπὲρ τῆς πατρίδος τελευτήσαντες ἐν αὐτῇ τῇ πατρίδι καλῶς ὦσι τεθαμμένοι.

Besides the light this sheds on the continued strength of old-style civic patriotism and its corollaries in Ph.'s day, his recommendation also presupposes, on a functional level, constitutional authorities and mechanisms to agree on and implement such a policy. A decision-making citizen community, in short, is there in the background. This same community, by means of similar decisions, is to issue pots paid for out of public funds (A76.1–3 [*85.22–24*]), store non-perishable foodstuffs (B1.1–3 [*86.21–23*]), stockpile a year's worth of grain (B30.1–2 [*88.20–21*]), build and deploy intra-mural artillery (C26 [*93.1–3*]), acquire and distribute arms and armour to those who do not have their own (C27 [*93.3–4*]), show its realisation that war-heroes do not necessarily come only from its own ranks by giving mercenary casualties a lavish burial at public expense (C47 [*94.26–29*]; see already above, sub-section iv), and ensure the availability of doctors and the medical supplies their work requires (C72–73 [*96.15–26*]).

(viii) The Military

Military matters have impinged upon most of the topics already surveyed here, and inevitably so, given the very nature of the treatises themselves. Both of them are didactic in form and approach, and this shows itself from the outset in the grammar and syntax chosen. Aeneas, after his Preface, begins with how troop-dispositions 'should be made', χρηστέον (1.1), and the several ways that Greek has of saying that something should or must be done reappear copiously thereafter. It is just the same with Ph., starting with δεῖ in A1: see above, section C. But to whom do these injunctions apply? On occasion the phraseology makes this explicit. In Aeneas see, for instance, 3.5 (rhymarchs), 15.2 (generals), 22.29 (lochagoi); in Ph., A1.1–2 [*79.1–2*] (fortification-builders) and C29 [*93.8–11*] (generals). But more often such explicitness is lacking; and this, one can only suppose, is because the point is considered self-evident. The matter of the intended readership of both Aeneas and Ph. has literary and cultural dimensions which blur the identity of those who are likely, in reality, to be carrying out the writers' advice;[122] nevertheless, if we restrict the issue to that latter question – who will actually be doing what in the writer's opinion 'must' or 'should' be done? – the answer seems plain enough in broad terms.

As regards Aeneas, I am on record elsewhere as seeking to refine the orthodox perception of his treatise as one exclusively addressed to military commanders:

> When [Aeneas] allows himself the use of the second person, singular or plural, the 'you' in question is, admittedly, always a military 'you': the commander, with or without his troops [see 9 *passim*, 16 *passim*, 22.19, 33.4, 37.2]; and, more broadly, even when the recommendations lack a personal focus of this kind (as for most of the treatise they do) the *bulk* of them are such as would naturally be intended for, and implemented by, 'the general in overall command' (22.2), 'the city-commander' (26.2). However, could such a military official appoint ambassadors (10.20) or intervene between debtors and creditors (14.1)? Perhaps the answer is that, under the kind of martial law imposed in chapter 10, he could. But the fact remains

122 On Aeneas in this regard see Whitehead, *Aineias* 34–42; on Ph., more briefly, Garlan, 'Cités' 19 (expanded in Garlan 284–285), and see above, section B.

> that, catering as he was for poleis in general and not any one polis in particular, [Aeneas] is studiously vague about the exact nature of the constitutional authority, military and/or civil, to which his putative polis 'under siege' is subject, and, *a fortiori*, about any modifications to it necessitated by wartime conditions. This enabled him to encompass a range of different power-structures, and responses to crisis, which any given polis might in reality possess or adopt: officials whose sphere of responsibility and leadership combined the civil and the military; civil magistrates temporarily invested with military functions; a citizen general given unrestricted powers (*stratēgos autokratōr*), dictator-style; or even – though there are no tangible signs of this in the treatise – a military expert hired from outside the community. [123]

Revisiting this analysis now, I see little reason to alter it. Rather than advocating just one of the models listed there (as scholars then tended to do) we should make room for them all, as being, all, authentic variations on Aeneas's single, military-driven theme.

In Ph. too the picture is partly blurred, but for different reasons.

He addresses himself first to 'those who are building' (τοὺς οἰκοδομοῦντας: A1.2 [*79.2*]). By A7.1–2 [*79.26–80.1*] this third-person plural undergoes its first shift, like the ones in Aeneas, into a second-person singular (ἐὰν δὲ πλινθίνους οἰκοδομῇς), which serves double duty for both the treatise's recipient Ariston and the notional builder(s). In the latter case, are we to envisage *viri militares*? There is actually nothing, anywhere in part A, which depicts such construction work as carried out under exclusively military auspices. Rather, again, a range of options may be in play, depending on whether the building is taking place in peacetime conditions or under the exigencies of war, and also whether specialist military engineers like Polyidus (A44.2–3 [*83.8–9*]) are involved. (The two mentions of Rhodes, A17.1–2 [*80.45–46*] and A59.4 [*84.8*], shed light neither on Rhodes itself nor on the general issue.)

Part B turns to matters inside the city, especially food and various means of storing and preserving it; the latter include the building of granaries etc. (B6–29 [*86.39–88.20*]). Here again, for the most part, the actions recommended seem to be ones that could be undertaken just as well by civilian as by military authority, though the final passage on a purpose-built signalling device (B55–57 [*90.28–45*]) does conjure up an unmistakeably military scene. It thus serves as a transition to the third and fourth parts, where siege-warfare proper is the setting, from the perspectives of both defence (C) and attack (D).

The (implied) commander *inside* the city, besides his manifold responsibilities for the physical aspects of defence which take up the bulk of the material, has up to four categories of troops at his disposal.[124] The two most frequently mentioned, and indeed generally mentioned together (C2.1–2 [*90.49–50*], C18.5–6 [*92.26–27*], C30.7–8 [*93.17–18*], C34 [*93.32–36*]), are 'citizens' – of whom the poorest are

123 Whitehead, *Aineias* 40–41. My footnote to this last point should also be quoted again: Aeneas 'nowhere states an expectation (let alone a recommendation) that the polis's military supremo should be one of its own citizens, but this does seem implicit, especially in the contrast between the commander's relations with his citizen militia (26.7–11, 38.4–5) and with mercenary and allied troops (10.18–19, 12.1–5, 22.29)'.

124 Garlan, 'Cités' 24–25. (A different kind of categorization is made, in passing, in C44 [*94.13–20*]: between 'the hoplites' and 'the light-armed.)

armed at public expense (C27 [*93.3–4*]) – and 'soldiers' (στρατιῶται, i.e. mercenaries). Either directly or indirectly he must attend to the needs of the latter scarcely less than those of the former (C45–48 [*94.20–31*]: see already subsection iv). In addition, D13–14 [*97.41–49*] will casually refer (from the attackers' standpoint) to the prospect of metic and/or slave combatants inside the town. As regards the situation *outside*, 'he who intends to capture cities' (τὸν μέλλοντα λήψεσθαι τὰς πόλεις: D2.1 [*96.28*]) is advised to stand aloof from the combat rather than risk participating in it (D20 [*98.20–24*], D28 [*99.3–6*]. From that safe vantage-point he can do whatever is necessary, by force and/or stealth, to achieve his objective. By D70–71 [*101.42–102.8*] it *is* achieved (before D72–111 [*102.9–104.42*] revert to earlier phases in the timescale) – but there, as throughout, the 'citizens' are of course those of the overrun city itself; their successful opponents are 'soldiers' only (see already sub-section vi), and Ph. is unconcerned to specify whether this is likely to mean mercenaries alone or whether it might embrace citizen troops from enemy poleis.[125]

(ix) The Gods

Whatever his personal views in this area, Aeneas depicts a society devout in its determination to do honour to the gods. As noted earlier (sub-section iv), his Preface's list of 'the fundamentals', τὰ μέγιστα, which men of his era were prepared to stand and fight for begins with ἱερά. Regardless of whether one translates it broadly as 'holy things' or more narrowly as 'shrines' or 'temples', the point is striking, and made no less so by the fact that the language here seems to be drawing on commonplaces of the time.[126] This, therefore, is the background against which it is legitimate to characterize Aeneas's treatment of religion as 'distinctly businesslike'.[127] In particular, the martial-law provisions of 10.3–5 impose the requirements of military security upon the niceties of customary religious observance and sensibilities by, most notably, requiring all festival celebrations to be intramural (κατὰ πόλιν: 10.4). And in case the need for this is not fully appreciated, 17.1 hammers it home: 'in a polis lacking unity and full of mutual suspicion, foresight and caution is required when crowds go out to see torch-races, horse-races or other contests; in short, at all mass religious ceremonies and armed processions outside the walls, not to mention occasions when the community beaches its ships or buries its dead. The reason is that a faction can exploit even an opportunity of such a kind to get the better of its opponents'.[128]

125 Cf. Garlan, 'Cités' 25–26; and see further in the Comm. to C2 under **<…> καὶ φείδεσθαι**.

126 His list, ἱερῶν καὶ πατρίδος καὶ γονέων καὶ τέκνων καὶ τῶν ἄλλων, maps closely onto μήθ' ἱερῶν μήτε γονέων μήτε παίδων μήτ' ἄλλου μηδενὸς φροντίζει in Isoc. 8.93. More generally cf. e.g. Aesch. *Pers*. 402–405 (the war-song at Salamis); Thuc. 7.69.2 (Nicias to his troops at Syracuse in 413).

127 Whitehead, *Aineias* 98.

128 Aen.Tact. 17.1: Ἐν δὲ μὴ ὁμονοούσῃ πόλει καὶ ὑπόπτως πρὸς ἀλλήλους ἐχόντων χρὴ προνοοῦντα εὐλαβεῖσθαι τὰς μετ' ὄχλου ἐξόδους ἐπὶ θεωρίαν λαμπάδος καὶ ἱπποδρομίας καὶ τῶν ἄλλων ἀγώνων ὅσαι γε ἱεροποιίαι πανδημεὶ ἐκτὸς τῆς πόλεως καὶ σὺν ὅπλοις πομπαί

He might have added that an external enemy might well seek to do the same – as, precisely, Ph. counsels a would-be attacker to do in D2.1–4 [*96.28–31*]: 'he who intends to capture cities must, for preference, make the attack during a festival which they are celebrating outside the gates'.[129] Given the forcefulness of that piece of advice, it is arguably a surprise that Ph.'s defenders have not been told (as Aeneas's were) to discontinue such events, or at the very least to be aware of the risk they posed and the vulnerabilities they exposed. Yet when one bears in mind that his solitary allusion to the ongoing presence of the gods in these cities is the oblique one given at B48.1–3 [*89.38–40*] – the wisdom of establishing fruit-and-vegetable gardens not only in private houses and on akropoleis but also 'in the <groves and> precincts of the gods' (ἔν τε τοῖς <ἄλσεσι καὶ> τεμένεσι τῶν θεῶν) – it is hard to avoid the conclusion that religion did not loom very large in Ph.'s preferred scheme of things. It called for a strictly utilitarian approach.

(x) Overview

Aeneas's polis displays a set of characteristics which, individually and in aggregate, paint a sombre picture of Greek polis society in the mid-fourth century. The small and medium-sized Aegean communities catered for and depicted in his treatise are so riven with political, social, economic, and ideological tensions that the business of offering them (or their leaders) advice for surviving a hostile blockade could not confine itself to narrow military matters. It had to recognize, and attempt to devise strategies against, an uncomfortable overarching reality: the Enemy Within, who is at least as much to be feared as is the Enemy Without.[130]

What of Ph.'s polis? The same, by and large, or different?

The intervening years had witnessed very significant advances in military technology, as regards both offensive weaponry, especially artillery, and the structures and resources – not only walls etc. but defensive weaponry – intended to withstand it. Amongst other indices of this, Ph. devotes far more space to such matters than Aeneas had needed to. Yet for that very reason (and at the risk of compressing a complex subject into too small a compass here),[131] one sees little sign that *in these terms* the balance of overall advantage had undergone a decisive shift, either way,

ἐκπέμπονται, ἔτι καὶ περὶ τὰς πανδήμους νεωλκίας καὶ τὰς συνεκφορὰς τῶν τελευτησάντων· ἔνι γὰρ καὶ ἐν τοιῷδε καιρῷ σφαλῆναι τοὺς ἑτέρους.

129 Ph. D2.1–4 [*96.28–31*]: Τὸν μέλλοντα λήψεσθαι τὰς πόλεις, ἐὰν προέληται, δεῖ μάλιστα μὲν ἑορτῆς οὔσης ἢν ἄγουσιν ἔξω τῶν πυλῶν … τὴν ἐπίθεσιν ποιεῖσθαι. See more fully below, in section X(α).

130 Aeneas never precisely formulates the matter thus, but see Plat. *Rep.* 3.417B, on what will happen if his Guardians are allowed private property: they will pass their lives 'more in fear of the enemies within than of those outside' (μᾶλλον δεδιότες τοὺς ἔνδον ἢ τοὺς ἔξωθεν πολεμίους). While the adult Plato lived in a city which, for decades on end, was both safe from military attack and unusually stable in its internal affairs, it may be doubted whether Aeneas enjoyed either of those luxuries.

131 G. Shipley, *The Greek World after Alexander 323–30 BC* (London 2000) 334–341 has a useful synopsis; more detail in Rihll, *Catapult* 106–139.

since Aeneas's time. Instead, both on the macrocosmic level and in its microcosmic applications and refinements, Ph.'s picture (in his parts C and D) of the straightforwardly military side of siege-warfare in his day evinces much of the weary predictability of a chess game between competent but uninspired players. Each of them is drilled in the gambits and the nullifying counter-gambits of the exercize; what Polybius, writing of Philip V's siege of Abydos in 201, calls 'the practical ideas through which both <besiegers and> besieged are accustomed to match each other's contrivances and to revel in artifice' (τῶν ἐν τοῖς ἔργοις δι' ὧν οἵ τε <πολιορκοῦντες καὶ> πολιορκούμενοι πρὸς ἀλλήλους εἰώθασιν ἀντιμηχανᾶσθαι καὶ φιλοτεχνεῖν: Plb. 16.30.2).[132]

That being so, we may for present purposes leave aside the "hardware" aspects of Ph.'s polis under siege and focus on more human questions. Is it still true that a serious level of threat comes from the Enemy Within?

One can certainly say that Ph. himself is not as preoccupied by it as Aeneas had been. Aeneas's fears on that score colour his entire treatise, virtually. In Ph., the decision to begin with long discussions of fortification (A) and provisioning (B) offer only limited scope, perhaps, for raising issues of loyalty and treachery, though Aeneas had mentioned the need to provide the poor with 'necessities' (ἀναγκαῖα) as part of ensuring that unanimity, *homonoia*, without which he feared that disaffected parts of the citizen-body would imperil the *status quo* (14). One waits in vain for Ph. to do the same, or (e. g.) to give, when he is considering gates (C30 [*93.11–23*]), earnest Aenean warnings about the need for reliable gatekeepers. Warnings are there, to be sure, but they are sounded in a lower key – chiefly the reference to any untrustworthy 'soldiers or citizens' who might communicate with the enemy (C34–35 [*93.32–41*], summarized in C35.3 [*93.38*] as 'someone on the inside, acting wickedly', τῶν ἔνδοθέν τις κακουργῶν) – until the pivotal D72 [*102.9–12*]. There, at long last, the whole approach shifts to a much more Aenean one: 'if in your siege you cannot take the city by force because of its being strong (when approached) from every side, an attempt should be made to take it either by <stealth or> treachery or starvation'.[133] Each of these scenarios sheds its own light on Ph.'s polis.

(α) Stealth *(κλοπή)*

Here in D73–75 [*102.12–27*] the topic turns out to be quite limited. Attack 'by stealth' (κατὰ κλοπήν) is glossed as nocturnal (νυκτός) and is aimed at scaling the city walls undetected – the outworks, evidently, having already been overcome – by various means: dubious-sounding semi-inflatable ladders, iron pegs, and Egyptian-

132 It should be possible to think in these traditional terms without denying that the "siege as game-playing" model has not only mechanistic facets but psychological and moral ones. See J. Levithan, *Roman Siege Warfare* (Ann Arbor 2013), esp. chap.3, much of which is equally applicable to its Greek counterpart.

133 Ph. D72 [*102.9–12*]: Ἐὰν δὲ μὴ δύνῃ πολιορκῶν κατὰ κράτος λαβεῖν τὴν πόλιν διὰ τὸ ἰσχυρὰν εἶναι αὐτὴν πάντοθεν, ἐπιχειρητέον ἢ κατὰ <κλοπὴν ἢ> προδοσίαν ἢ λιμὸν αὐτὴν ἑλεῖν.

style iron grapnels with climbing loops. However, a more striking, all-encompassing passage on the subject has already occurred, at D2–4 [*96.28–37*]:

> (D2) He who intends to capture cities must, for preference, make the attack during a festival which they are celebrating outside the gates; otherwise, at (grain-)harvest <or> vintage time; (3) for by intercepting most of the people outside the city you might most easily capture the town; (4) otherwise, at night, when there is a storm or when the enemy are drunk at some public festival, approach the wall secretly, with ladders ready and seize some of the towers.[134]

While D4 obviously anticipates D73–75 (albeit with extra possibilities not repeated there), D2–3 has already, as we see, advocated a course of action designed to obviate the need for the assailants to confront the walls at all. As Garlan notes, what is envisaged suggests that Ph. would have agreed with Aeneas that festivals should be celebrated in town (κατὰ πόλιν: 10.4) when enemy forces were in the vicinity.[135] And the importance which Aeneas himself attached to the topic is clear from the fact that he returns to it in his ch.17; first (17.1) declaring that 'foresight and caution is called for when crowds go out to see torch-races, horses-races, or other contests: in short, at all mass religious ceremonies and armed processions outside the walls, not to mention occasions when the community beaches its ships or buries its dead',[136] and then (17.2–4) giving a cautionary instance from the history of Argos.

Ph., as usual, makes his point without any such paradigmatic illustrations, but one is left wondering why it is made only from the aggressors' side, i.e. why not already in part C. The answer more probably lies in his *de facto* failure to create parts C and D as perfect mirror-images of each other than in any deliberate wish to understate the issue. Furthermore, irrespective of Ph.'s personal opinions on the matter, if any, there is no good reason to think that poleis in his day lived less of their communal lives intramurally, or that the kind of events he mentions in D2–3 did not continue to be sources of anxiety for the men charged with keeping the poleis safe, and sources of opportunity to their enemies.

(β) Treachery *(προδοσία)*

C34 [*93.32–36*] has already raised the possibility from the defenders' standpoint that some individuals inside the town will be untrustworthy, and part D does not omit to take this up, now, from the attackers' side:

> (D65) Do not skimp on money, whether in bribery or in other expenses; once you have taken the city you may recoup it many times over.[137]

134 Ph. D2–4 [*96.28–37*]: (2) Τὸν μέλλοντα λήψεσθαι τὰς πόλεις, ἐὰν προέληται, δεῖ μάλιστα μὲν ἑορτῆς οὔσης ἣν ἄγουσιν ἔξω τῶν πυλῶν, εἰ δὲ μή, ἀμητοῦ <ἢ> τρυγητοῦ ὄντος τὴν ἐπίθεσιν ποιεῖσθαι· (3) πλείστους γὰρ ἔξω τῆς πόλεως ἀπολαβὼν ἀνθρώπους ῥᾳδιέστατ' ἂν λάβοις τὸ ἄστυ· (4) εἰ δὲ μή, νυκτός, χειμῶνος ὄντος ἢ μεθυόντων τῶν πολεμίων ἔν τινι δημοτελεῖ ἑορτῇ κλίμακας ἑτοίμους ἔχοντας λάθρα πλησιάσαντας τῷ τείχει τῶν πύργων τινὰς καταλαβέσθαι.

135 Garlan, 'Cités' 29–30, reiterated Garlan 393.

136 For the Greek of 17.1 in full, see above, at n.128.

137 Ph. D65 [*101.28–30*]: Μὴ φείδου δὲ χρημάτων μήτε κατὰ δωροδοκίαν μήτε κατὰ τὰς ἄλλας δαπάνας· ἑλὼν γὰρ τὴν πόλιν πολλαπλάσια λήψῃ.

> (D76) Either send for one of the men inside, as (if?) to have a discussion about terms (of surrender), or by means of unseen messages, sending in heralds or envoys and giving (them) recognition-tokens and money. [77–82 exemplify methods of secret messaging.] (83) Should (the cities) not be brought down by letters being sent thus, send others to the leading men of affairs, promising them great rewards and money; when they come to light they will make some people seditious <…>.[138]

Ph. then briefly turns to the option of capturing a city by starvation (γ, below), but he revisits a treachery scenario at D96–98 [*103.39–45*], where the putative context has become (at D88 [*103.19–25*]) the anticipated arrival of reinforcements for the besieged, in what is otherwise a position of equality or superior strength for the besiegers:

> (D96) Try too, at the outset, to corrupt the (enemy) generals or commanders by giving money and promising rewards: (97) for if you decide (to act) thus, victory occurs and there is no other stratagem like it; (98) and the money will be (recoverable) from the besieged once the city has been taken.[139]

Although buying off those in command of a reinforcing army in this way – particularly if (as would typically be the case) it were a mercenary force – does not of course shed direct light on Ph.'s polis as such, the earlier passage, D83 [*102.50–103.3*], does just that. Textual problems obscure the fine detail of it, but plain enough is the overall aim of fomenting stasis in the beleaguered community; and the importance of this has already been highlighted all the way back in D15 [*97.49–52*]. Here is that passage in context (D12–16 [*97.34–98.4*]):

> (D12) Make proclamations, too, in the enemies' hearing, such as these: '<to those who have provided information about> (?)stockpiles of iron tools for undermining and locations of machines and similar things, and if anyone after killing some of the engineers or those who are noteworthy in respect of artillery, or <if any> of the leading men opposed to the status quo comes to us, (him we promise) to honour and give money'; (13) (you) would (promise) to free a slave, promote a soldier, crown a metic hoplite, and give rewards worthy of the actions performed. (14) Proclamations of this kind are particularly likely, somehow, <to disturb> the minds of the opponents and make them no longer arm the metics and the slaves and give (them) the well-established rations; (15) in these circumstances the combatants will be fewer and they will consume more provisions (than others) and swiftly there will be some sedition in the city. (16) If those who are of no use come to you, do not accept them, in order that the food of the besieged will be consumed sooner.[140]

138 Ph. D76–83 [*102.27–103.3*], here abridged: (D76) ἢ μεταπεμψάμενός τινα τῶν ἔνδοθεν ὡς διαλεξόμενον περὶ διαλλαγῶν ἢ δι' ἐπιστολῶν ἀφανῶν κήρυκας ἢ πρεσβευτὰς εἰσπέμπων καὶ σύμβολα διδοὺς καὶ χρήματα. […]. (83) Ἐὰν δὲ μὴ καθαιρεθῶσιν ὑπὸ τῶν οὕτως πεμπομένων γραμμάτων, ἄλλας πέμπε πρὸς τοὺς ἡγουμένους τῶν πραγμάτων ὑπισχνούμενος δωρεὰς μεγίστας καὶ χρήματα· αἳ καταφανεῖς γινόμεναι τοὺς μὲν στασιάζειν ποιήσουσιν < …>.

139 Ph. D96–98 [*103.39–45*]: (D96) Καὶ πειρῶ πρῶτον τοὺς στρατηγοὺς ἢ τοὺς ἡγεμόνας φθεῖραι χρήματα διδοὺς καὶ δωρεὰς ὑπισχνούμενος· (97) οὕτως γὰρ ἐὰν κρίνῃ, γίνεται νικᾶν καὶ οὐδέν ἐστιν ἕτερον στρατήγημα τοιοῦτον· (98) καὶ τὰ χρήματα ἐκ τῶν πολιορκουμένων ἔσται τῆς πόλεως ληφθείσης.

140 Ph. D.12–16 [*97.34–98.4*]: (D12) Ποιοῦ δὲ καὶ κηρύγματα τῶν πολεμίων ἀκουόντων τοιαῦτα· <τοῖς μηνύσασιν> ὁπλίσεις τε σιδήρων ὑπορυκτικῶν καὶ μηχανημάτων στάσεις καὶ τὰ τούτοις ἀκόλουθα, καὶ ἐὰν ἀποκτείνας τις ἢ τῶν μηχανοποιῶν τινὰς ἢ τῶν ὄντων ἐπὶ τῶν βελῶν ἀξιολόγων ἢ <ἐάν τις> τῶν ἐνδόξων ἐναντιουμένων τοῖς πράγμασι παραγίνηται πρὸς αὐτούς,

Towards the end of his own discussion of this treachery topic, Garlan ventures the suggestion that Ph., by contrast with Aeneas, was 'plus technicien que psychologue'.[141] I can see what he meant, and I do not dissent from it as the (reciprocal) comparison that it is; nonetheless, if there is a single section of writing, above all others, in Ph. that shows him fully attuned to the mind-games of siege warfare, this is it. True, the phenomenon of stasis may no longer be the exact same thing as it (often) had been in the mid-fourth century, with broad-brush ideological issues such as democracy vs. oligarchy as its main drivers. Yet power was still there to be competed for – with or without the extra dimension of allegiance to one monarchical regime or another – and Ph. leaves us in no doubt that power-struggles might still offer those seeking to take control of a city the opportunity to do so without going to the trouble of military effort.

(γ) Starvation *(λιμός)*

Following stealth and treachery, the third option for capturing a city (other than through a direct frontal assault) listed by Ph. in D72 [*102.9–12*] is by 'starvation', *limos*. D84–85 [*103.4–11*] takes up the matter:

> (D84) Surround (the city) with a palisade and fortify some strong place (next) to the city and establish (there) reliable guards, who will prevent anything being brought in, whether by land or by sea. (85) When you have done this, turn to other matters, and you should take the city either after military success or after squeezing it out by starvation, and you will not fall short at all in your endeavours.[142]

Evidently he did not consider that this, *qua* military operation, called for further comment; and one can agree with him in the light of everything he has already said on the matter (from both sides of the confrontation) by this stage of the treatise.

Here in part D, the value of blockading the enemy city and so cutting off its supplies is noted early on. If surprise attacks of the various kinds mentioned in D2–4 [*96.28–37*] fail,

> (D5) and the city is by the sea, palisade it round from sea to sea, and if you have warships, anchor them at the harbour, in order that nothing can sail in. (6) But if the city is not situated thus,



τιμήσειν καὶ χρήματα δώσειν· (13) καὶ τὸν μὲν δοῦλον ἐλεύθερον ἂν ἀφεῖναι, τὸν δὲ στρατιώτην ἀναβιβάσειν, τὸν δὲ ὁπλίτην μέτοικον στεφανώσειν, καὶ δώσειν δωρεὰς τὰς κατ᾽ ἀξίαν τοῦ πραχθέντος ἔργου. (14) Τὰ γὰρ τοιαῦτα κηρύγματα μάλιστά πως εἴωθε τῶν ἐναντίων τὰς διανοίας <ταράττειν> καὶ τοὺς μετοίκους καὶ τοὺς οἰκέτας ποιεῖν μηκέθ᾽ ὁπλίζειν καὶ διδόναι τὰ καλῶς ἔχοντα ἐπιτήδεια· (15) τούτων δὲ γινομένων ἐλάττους οἱ κινδυνεύοντες ἔσονται καὶ πλείονα σῖτα ἀναλώσουσιν καὶ τάχα στάσις τις ἔσται ἐν τῇ πόλει. (16) Τοὺς δ᾽ ἀχρείους ὄντας ἐὰν παραγίνωνται, μὴ προσδέχου, ἵνα τροφὴ τῶν πολιορκουμένων θᾶττον ἀναλίσκηται.

141 Garlan, 'Cités' 32.

142 Ph. D84–85 [*103.4–11*]: (D84) περιχαρακώσας καὶ τόπον ἰσχυρὸν περιτειχίσας τινὰ τῇ πόλει καὶ φύλακας ἀσφαλεῖς ἐπ᾽ αὐτῷ κατασκευάσας, οἳ κωλύσουσι μήτε κατὰ γῆν μήτε κατὰ θάλασσαν μηδὲν εἰσκομίζεσθαι. (85) Ταῦτα δὲ ποιήσας γίνου πρὸς τοῖς ἄλλοις πράγμασι καὶ λήψῃ τὴν πόλιν ἢ τῷ πολέμῳ κατορθώσας ἢ ἐκθλίψας λιμῷ, καὶ οὐθὲν καθυστερήσεις τῶν πράξεων.

> position the camp out of range in (one of) the most secure places, encircling it with a palisade as far as is possible; then post guards and undertake the siege. First, make a proclamation that nobody is to ravage or forage. Secondly, calculate the agricultural produce and distribute it between (your) formations or command-units; (7) and (thus) the soldiers will have everything they need and the (enemy) citizens will more quickly do what we want because their property is undamaged. (8) After this, as regards anything round the city that furnishes either security or benefit <to those> inside, eradicate some items and cut out others, and divert the waters that flow in – for thus they will be especially frightened and you, if you want, can use your engines), etc.[143]

The scenario then moves on (in D9–11 [*97.9–34*]) to precisely that, the preparation of machinery; then comes D12–16 [*97.34–98.4*], quoted under β above. This in turn gives way to a much longer stretch of writing (D17–58 [*98.4–101.2*]) devoted uninterruptedly to the strategy and tactics of direct assault, but the theme of supplies in general and food in particular then re-surfaces, at D59–60 [*101.2–11*]:

> (D59) And if your intention is to besiege the city for a long time, give the enemy the impression that you will be besieging them for a short time, in order that they may abundantly consume the commodities earmarked for provisioning and may not be prepared for the assaults to come, or send for help; (60) but if you are besieging (aggressively), threaten to persevere for a long time, in order that, fearful of the future, they may concede to us sooner what we want.[144]

Whether in the age of Aeneas or that of Ph., the historiography of siege warfare offers numerous instances where the kind of approach advocated here brings about the desired outcome, with or without renewed military action. Sooner or later the food does run out, and the city either surrenders or is overwhelmed. But the record – again, in the classical period and the Hellenistic alike – also contains counter-examples, of sieges and blockades which from the assailants' standpoint ended in frustration and failure. Naturally, the reasons for this vary from case to case, but, on the basis of evidence in some instances and common sense in others, it is necessary to recognize that bringing a community to its knees by the sort of means sketched here in Ph.'s part D was by no means always the straightforward matter it might sound at first hearing.

143 Ph. D5–8 [*96.37–97.9*]: (D5) ἐὰν μὲν ἐπιθαλάσσιος ᾖ ἡ πόλις, περιχαρακῶσαί τε ἐκ θαλάσσης εἰς θάλασσαν, καὶ ἐὰν ἔχῃς σκάφας μακράς, ἐπὶ τοῦ λιμένος ἐφορμεῖν, ἵνα εἰσπλέῃ μηθέν. (6) Ἐὰν δὲ μηδ᾽ οὕτως ἡ πόλις ᾖ ἐκτισμένη, βαλόμενος τὸ στρατόπεδον ἔξω βέλους ἐπὶ τοὺς ἀσφαλεστάτους τόπους, περιχαρακώσας κύκλῳ ὡς ἂν ᾖ δυνατόν, εἶτα φύλακας καταστήσας ποιοῦ τὴν πολιορκίαν, πρῶτον μὲν κήρυγμα ποιησάμενος μηθένα φθείρειν ἢ προνομεύειν, δεύτερον δὲ λογισάμενος εἰς τάγματα ἢ ἐπαρχίας τὰ γεώργια· (7) καὶ οἱ στρατιῶται πάντα τὰ δεόντα ἕξουσιν καὶ οἱ πολῖται θᾶττον ὃ βουλόμεθα ποιήσουσιν ἀφθάρτων τῶν κτημάτων ὄντων. (8) Μετὰ δὲ ταῦτα περὶ τὴν πόλιν ὅσα ἐστὶν ἢ ἀσφάλειαν <τοῖς> ἔνδον ἔχοντα ἢ ὠφέλειαν, τὰ μὲν κατασκάψαντας τὰ δὲ ἐκκόψαντας, καὶ τὰ ὕδατα τὰ ἔσω ῥέοντα ἀποστρέψαντα (οὕτω γὰρ [ἂν] μάλιστα δειλωθήσονται καὶ σὺ τοῖς ὀργάνοις ὡς βούλει χρήσῃ) κτλ.

144 Ph. D59–60 [*101.2–11*]: (D59) Καὶ ἐὰν μὲν πολὺν χρόνον μέλλῃς πολιορκεῖν τὴν πόλιν, δόξαν ἐμποίει τοῖς πολεμίοις ὡς ὀλίγον χρόνον πολιορκήσων, ἵνα δαψιλῶς ἀναλίσκωσι τὰ πρὸς τὴν τροφὴν ἀνήκοντα καὶ μὴ παρασκευάζωνται πρὸς τὰς ἐσομένας προσβολὰς μηδὲ βοήθειαν μεταπέμπωνται· (60) ἐὰν δὲ πολιορκῇς, ὡς πολὺν χρόνον προσκαρτερήσων ἀπείλει, ἵνα φοβηθέντες τὸ μέλλον θᾶττον ἡμῖν συγχωρήσωσιν ὃ βουλόμεθα. D61–64 [*101.11–27*] expand into uses that besiegers can make of the besieged's livestock: see above, under sub-section v.

Aeneas, for his part, is certain to have discussed in his lost *Procurement* and *Preparation* the means whereby poleis that were either anticipating a siege or actually experiencing one might hope to survive with sufficient stocks of food (etc). Beyond saying that, reconstructing what the substance of his advice was cannot safely go beyond the selection of topics he happens, retrospectively, to mention (in 7.4, 8.2–5, 14.1–2, 21.1 and 40.8). With Ph., though, part B shows his hand in considerable detail. The twin pillars of his policy are stockpiling grain and other non-perishable foodstuffs important for nutrition and health – in the case of grain, enough for a whole year (B30 [*88.20–25*]), maintained as edible in purpose-built granaries and the like (B6–29 [*86.39–88.20*]) – and doing so by means which combine public provision with private enterprise; for the latter see especially B1–5 [*86.21–39*], B31 [*88.25–31*] and B48 [*89.38–46*].

Reading this material appears to give hints of well-balanced, orderly communities not merely determined to survive but quite likely to do so, by this mix of private and public initiatives. In particular, B48 (together with B31) calls to mind patriotic campaigns of the "Dig for Victory" type, in both World Wars of the last century. But of course, whether in modern times or in ancient, such cheerful resolve has its obverse in the spectre of real hardship, genuine hunger; and in Ph.'s city this is squarely addressed in B31–47 [*88.25–89.38*]. While not every ingredient (and culinary process) mentioned there can be identified with certainty in present-day terms, the main thrust is straightforward enough, in two respects. First, no matter how much grain has been stockpiled and conserved, the inhabitants of Ph.'s city when under actual siege are likely to go hungry; so, rather than simply succumbing to starvation or starvation-induced diseases, they must face the prospect of supporting life by eating controlled quantities of prepared, multi-ingredient foods (with strong tastes), which combine the properties of appetite-suppressing drugs with those of high-energy ration-packs.[145] Secondly and more broadly, most of these people must *already* be acclimatized to a daily diet in which, like it or not, legumes play a vital role alongside cereals,[146] and ideal definitions of what is fit for human consumption are not always sustainable in real-life conditions.[147]

145 See on this the Comm. to B31–47, esp. B31 under **τοῦ Ἐπιμενιδείου φαρμάκου**.

146 See A. Dalby, *Food in the Ancient World from A to Z* (London 2003) 162 and 194 on the hierarchy of preference here, with legumes 'generally the less-favoured staple'; cf. P. Garnsey, *Food and Society in Classical Antiquity* (Cambridge 1999) 15.

147 See generally P. Garnsey, *Famine and Food Supply in the Graeco-Roman World: responses to risk and crisis* (Cambridge 1988) 28–29 on 'the consumption of unfamiliar foodstuffs' in times of need. (Garnsey, *Food* 36–41 on 'famine foods' covers the same ground rather differently.) In the five-stage schema there (noted by Dalby, *Food* 139–140) of such items 'in descending order of desirability from the consumer's point of view', Ph.'s prescriptions stop short of no.4 ('"last resort" natural products or non-foods such as roots, twigs, leaves, bark, leather') and, unsurprisingly, no.5 (human flesh, as, allegedly, at e.g. Poteidaia: Thuc. 2.70.1); nor do they plainly illustrate no.1 ('livestock not in ordinary circumstances destined for slaughter'), unless the suggestion about liver(s) in B4 [*86.35–37*] indirectly does so. His recommendations, rather, belong in the area of Garnsey's stages 2 and 3: "inferior" cereals (with which may be associated legumes) and 'regular animal food'. For the poor these two categories overlap, of course, even at the best of times.

By one means or another, then, Ph.'s part B depicts a community alive (whether before or after reading him on the subject) to a range of options in planning, nutrition, and psychological resilience designed to maximize its chances of withstanding an efficient blockade by hostile forces. Part C then adds to this picture the military elements which have the same end in view. It was an end that some poleis of the era did successfully achieve, just as some had done in Aeneas's day. However, even a year's reserve of grain might eventually be exhausted, and even the most ingenious and nourishing meal-substitutes might ultimately fail to keep body and soul together. D84–85 [*103.4–11*] appears to be confident that, from the aggressors' side, the starvation strategy will work, if adopted. Confidence, though, is bound to be the stock-in-trade of these writers. It is what the rhetoric of the genre demanded. Life – in the form, here, of the outcome of sieges with their multiple variables on both sides – had guaranteed no certainty either way for Aeneas's polis, and the same seems still to be true of Ph.'s.

INTERNAL (DIS)ORGANISATION OF THE TREATISE

Ph.'s material, in the reduced and often problematic form in which it has been transmitted, falls into four (somewhat unequal) parts, no matter whether they are called I–IV after Schoene or, as is more usual nowadays, A–D after Diels-Schramm. Either way, those who recognize this quadripartite structure at that level (rather than citing by the continuum of Thévenot pages and lines) follow the numbered sub-sections of each part used in Diels-Schramm. So much is agreed by all. But agreement does not extend into orthodox, accepted sub-sectioning *by topic*, whether that is explicit or implicit or both. Comparing one existing scheme with another – in particular those, for what became part I/A, of Rochas d'Aiglun (58 numbered chapters, 25 descriptive headings) and Graux (68 numbered chapters, grouped into 12 clusters of between 1 and 16; descriptions left implicit) – may well induce admiration for the resolve and ingenuity of the scholars concerned, but not necessarily, in equal measure, an enhanced grasp of Ph. and how to make the best of him.

The material as we have it cannot be fully and satisfactorily labelled in this kind of way. Though Ph. does deal with some topics as coherent or semi-coherent wholes, others are split between one location and another, or others. Many moments of division and transition are well-signposted and uncontroversial, yet sometimes it only becomes apparent that the subject has changed after that change has occurred; certain stretches of text are nothing more or less than miscellanies; and some material is palpably misplaced.

Users of the Diels-Schramm and Garlan editions, accordingly, are offered a mimimalist presentation, in which they must content themselves with drawing inferences from the paragraphing displayed (in both text and translation). Lawrence, by contrast, provides descriptors; and although I disagree in some instances with his judgment on what they are and where they should fall, he has in my opinion left his successors under an obligation to accept that the attempt must be made, as a matter of principle and as a service to readers. Here, therefore, I sub-divide Ph.'s material not only by paragraphing designed to mark implicitly how the main shifts in his discourse can be discerned, insofar as they can be, but also by explicit topic-headers, as follows. (Where they need to be justified or expanded, this is done in the thread of discussion about organisational issues throughout the Commentary.)

Part A: Fortification(s)

A1 [*79.1–7*]: foundations
A2–8 [*79.7–80.11*]: towers
A9 [*80.11–16*]: spur-walls at towers
A10 [*80.16–19*]: intramural perimeter road
A11–12 [*80.19–27*]: dimensions of walls
A13 [*80.28–31*]: joists in walls and towers
A14–19 [*80.32–81.5*]: superstructure of curtains
A20–28 [*81.6–46*]: towers and their apertures
A29 [*81.47–82.2*]: rough-faced masonry

A30 [*82.2–5*]: suiting wall-traces to terrain
A31 [*82.5–6*] (misplaced): rough-faced masonry, resumed
A32 [*82.6–14*]: extramural artillery
A33–35 [*82.14–27*]: posterns and sorties
A36–38 [*82.28–42*]: trenches and palisades
A39–43 [*82.43–83.7*]: the wall-trace in semicircles
A44 [*83.7–14*]: the serrated wall-trace
A45–54 [*83.15–47*]: the 'double' wall-trace
A55–58 [*83.47–84.5*]: the wall-trace with slanting curtains
A59–61 [*84.5–18*]: the 'old' wall-trace
A62–63 [*84.18–24*]: structural features of the 'double' system
A64–66 [*84.24–36*]: structural features of 'semicircular' towers
A67–68 [*84.36–42*]: outworks of towers
A69–78 [*84.43–85.35*]: general outworks
A79–80 [*85.35–41*] (misplaced): equipment for repelling close-quarter attacks
A81–83 [*85.41–86.2*]: general outworks, resumed
A84–85 [*86.3–13*]: the six wall-traces and the terrain they suit
A86 [*86.13–18*]: funerary towers
A87 [*86.18–21*]: conclusion/drawings

Part B: Provisioning and Preparation

B1–5 [*86.21–39*]: storing non-perishable foodstuffs
B6–9 [*86.39–87.1*]: sunken grain-pits
B10–24 [*87.2–51*]: raised granaries
B25–29 [*87.51–88.20*]: additional advice on grain-conservation, pits and granaries
B30 [*88.20–25*]: strategic policy on the stockpiling of grain
B31–47 [*88.25–89.38*]: foods, rations, recipes
B48 [*89.38–46*]: gardens
B49–53 [*89.46–90.24*]: provision of raw material, equipment and personnel
B54 [*90.24–27*]: purifying foul water
B55–57 [*90.28–45*]: a signalling system

Part C: Defensive Measures

C1 [*90.46–49*]: positioning one's own artillery
C2 [*90.49–91.3*] (misplaced): conserving manpower
C3–6 [*91.3–19*]: precautions and tactics against rock-projectors
C7 [*91.19–24*]: tactics against mining
C8–13 [*91.25–47*]: tactics against stoas
C14–17 [*91.47–92.22*]: tactics against 'machines', rams and boarding-bridges at close quarters
C18–27 [*92.22–93.4*]: precautionary and reactive tactics against a breach in the wall
C28–29 [*93.5–11*]: guard-duty, patrolling and passwords

C30–33 [*93.11–32*]: intramural security and retaliation
C34–38 [*93.32–52*]: more on passwords; password-supplements
C39–44 [*94.1–20*]: destruction of enemy equipment
C45–48 [*94.20–31*]: sustaining morale
C49–50 [*94.31–35*]: tactic against an enemy attacking uphill
C51–62 [*94.36–95.32*]: defence against seaborne assaults
C63 [*95.32–36*]: precautions against cross-fire
C64 [*95.36–39*]: another tactic against 'machines'
C65–66 [*95.39–49*]: more tactics against escalades etc.
C67–71 [*95.49–96.14*]: best use of one's own rock-projectors
C72–73 [*96.15–26*]: care of the wounded

Part D: Attacking Measures

D1 [*96.27–28*]: introduction
D2–4 [*96.28–37*]: taking the enemy by surprise
D5–11 [*96.37–97.34*]: preliminary logistics
D12–16 [*97.34–98.4*]: proclamations for psychological advantage
D17–20 [*98.4–24*]: initial positions
D21–23 [*98.24–34*]: when approaching by sea
D24–29 [*98.34–99.10*]: beginning the assault
D30–33 [*99.11–20*]: mining
D34–40 [*99.21–47*]: construction of equipment
D41–56 [*99.48–100.46*]: counter-measures
D57–58 [*100.47–101.2*]: repairs to 'machines' etc.
D59–60 [*101.2–11*]: wrongfooting the defenders' expectations
D61–64 [*101.11–27*]: livestock
D65 [*101.28–30*]: bribery and other expenditure
D66–69 [*101.31–42*]: minimizing risk to troops and their commander
D70 [*101.42–102.2*]: hazards of premature plundering
D71 [*102.3–8*]: securing strategic locations
D72 [*102.9–12*]: a hierarchy of choice?
D73–75 [*102.12–27*]: alternatives to assault, 1 – stealth
D76–83 [*102.27–103.3*]: alternatives to assault, 2 – treachery
D84–85 [*103.4–11*]: alternatives to assault, 3 – starvation
D86–100 [*103.12–51*]: responding to the arrival of enemy reinforcements by land
D101–110 [*104.1–40*]: responding to the arrival of enemy reinforcements by sea
D111 [*104.40–42*]: conclusion

SOME TEXTUAL ISSUES

(A) Divergences between Diels-Schramm and Garlan

The Diels-Schramm text could lay claim to be the default one nowadays, by being accessible via the on-line TLG. Garlan's, on the other hand, will for many users be the more readily available in hard copy. There is a very large measure of agreement between them; the divergences are listed here. I concur with Garlan in all instances except two (B20, D84). See the Comm. for discussion.

A1.3 [*79.3*]	D-S: ἀσφαλοῦς	G: ἀσφαλῶς
A6.6 [*79.26*]	D-S: ἐπιτάσεις	G: ἐπιστάσεις
A8.4 [*80.8*]	D-S: τῶν ἐσχάτων λίθων	G: οἱ ἔσχατοι τῶν λίθων
A8.4–5 [*80.8–9*]	D-S: δεθέντων. <…>	G: no punctuation, no lacuna
A11.2 [*80.20*]	D-S: τοίχων	G: τείχων
A12.2 [*80.26*]	D-S: αὐτά	G: αὐτό
A20.8–9 [*81.13–14*]	D-S: παρα<φόρων> γινομένων	G: παρατεινομένων
A30.3 [*82.4*]	D-S: <εὐρυχω>ρίαι	G: <εὐθυω>ρίαι
A36.4 [*82.31*]	D-S: μεθ' ἡμέραν [τὰ δὲ] νυκτός	G: τὰ μὲν ἡμέρας τὰ δὲ νυκτός
A37.5 [*82.36*]	D-S: μήτε <κλίμαξιν> μήτε	G: [μήτε]
A46.5–6 [*83.22–23*]	D-S: punctuate after δώδεκα	G: punctuate after ὄκτω
A47.1 [*83.23*]	D-S: <τῶν δ'> ἄνωθεν	G: ἄνωθεν
A48.2 [*83.26*]	D-S: [βάρεις]	G: <ἢ> βάρεις
A63.4 [*84.24*]	D-S: πύργων	G: βαρῶν
A67.1 [*84.36*]	D-S: [βαρῶν καὶ τῶν]	G: stet
B20.1 [*87.37*]	D-S: lacuna (before Ἐὰν δὲ κτλ)	G: no lacuna
C20.5 [*92.33*]	D-S: <πυλίδας>	G: <διόδους>
C46.2 [*94.25*]	D-S: ἀναβιβάζειν <καὶ> χώραν	G: ἀναβιβάζειν χώραν
C53.3 [*94.45*]	D-S: χιαστούς	G: χωστούς
C53.5 [*94.47*]	D-S: ἐπαλλάττοντας	G: ὑπαλλάττοντας
C54.1–2 [*94.49–50*]	D-S: πλοῖα ἐναντία <ὁρμίζεται>	G: no such verb added
C54.3 [*94.51*]	D-S: πλεῖστα	G: λεπτά
C64.2 [*95.37*]	D-S: προρρίπτειν	G: προσρίπτειν
D2.2 [*96.29*]	D-S: ἐὰν προέληται <ῥᾳδίως λαβεῖν>	G: no such supplement
D29.1 [*99.6*]	D-S: lacuna (before Ποιητέον δ' κτλ)	G: no lacuna
D29.4 [*99.9*]	D-S: καὶ τὸ τεῖχος κατὰ ταῦτ' ᾖ	G: κατὰ τὸ τεῖχος καὶ ταύτῃ
D30.1–2 [*99.11–12*]	D-S: λαθραίοις	G: λαθραίως
D39.2 [*99.42*]	D-S: <κατάφρακτοι καὶ> καταστεγεῖς	G: no such supplement
D70.10 [*101.51*]	D-S: σιταρκίας	G: σιταρχίας
D84.2 [*103.5*]	D-S: περιτειχίσας	G: ἐπιτειχίσας
D89.3 [*103.27*]	D-S: τὰ δὲ <περιττὰ ὅσ' ἂν δύνῃ>	G: no such supplement

(B) Textual Unorthodoxy in the Present Edition

Defining this, simply, as passages where I print something different from either Diels-Schramm or Garlan, a summary list of them follows here. Again, see the Comm. for discussion.

A1.1 [*79.1*]: <…>
A1.2 [*79.2*]: πύργους <καὶ τείχη>
A5.2 [*79.21*]: ὥσπερ νῦν οἰκοδομεῖσθαι καὶ τίθεσθαι
A9.4 [*80.14*]: <τὸ δὲ …>
A14.1 [*80.32*]: <τῶν μεταπυργίων> τὰ μέν
A15.1 [*80.33*]: τινὰ δὲ [τῶν μεταπυργίων]
A42.1 [*83.3*]: πυλίδας
A44.3–4 [*83.8–10*]: ἐν τῇ μετα<θέσει κα>τά τινας
A50.4 [*83.33*]: [καὶ κρίοις]
B1.2 [*86.22*]: ἀποκεῖσθαι πολλά
C8.1 [*91.25*] [καὶ τὰ μηχανήματα]
C8.2 [*91.26*] ἀπό του
C10.3–4 [*91.35–36*]: [τοῖς παλιντόνοις καὶ τοῖς μοναγκῶσι]
C14.11 [*92.6*]: κρίκους (for κριούς)
D2.1 [*92.28*]: Τὸν <δὲ> μέλλοντα
D48.1 [*100.17*]: τρύπανα (for δρέπανα)
D50.3 [*100.24*]: τὰς δ<ὲ χαρακώσεις>
D53.2 [*100.34*]: ἀγκυρίων

TEXT AND TRANSLATION

Numeration

Added in **bold type** is the Diels-Schramm referencing system, which divides the work into four lettered parts, each in numbered sections: **A1–87**, **B1–57**, **C1–73**, **D1–111**.

Added in *italics*, in square brackets, are the Thévenot (and Schoene) page numbers, *79–104*.

Other material in parentheses

Angled brackets, < >, in both Text and Translation, enclose material to be added.

Square brackets, [], in the Text only, enclose material to be deleted.

Round brackets, (), in the Translation only, enclose explanatory material.

A

[79] <Φίλων Ἀρίστωνι χαίρειν.>

(1) <…> Πρῶτον μὲν δεῖ τοὺς οἰκοδομοῦντας πύργους <καὶ τείχη> ὀρύξαντας μέχρι πέτρας ἢ ὕδατος ἢ τινος ἐδάφους ἀσφαλῶς τοῦτον ἀποστερεώσαντας τὸν τόπον ὡς μάλιστα τιθέναι τοὺς θεμελίους ἐν γύψῳ, ἵνα μὴ ἔνδον τῶν θεμελίων οἱ τοῖχοι ῥηγνύωνται μηδ᾽ ὑπορύττηται τὰ τείχη.

(2) Δεύτερον δὲ τοὺς πύργους οἰκοδομεῖν κατὰ τοὺς ἁρμόττοντας τόπους, τοὺς μὲν [ἀντὶ τῶν στρογγύλων] ἔξωθεν περιφερεῖς, ἔνδον δ᾽ ἔχοντας ἐπιφάνειαν οἵα γένοιτ᾽ ἂν κυλίνδρου τμηθέντος κατὰ τὴν βάσιν δίχα· (3) τοὺς δὲ ἑξαγώνους καὶ πενταγώνους καὶ τετραγώνους κατασκευάζοντας ἐκτιθέντας κατὰ μίαν γωνίαν, ἵνα ἀλλήλοις ἀμύνωσιν ἐκ τῶν πλαγίων ἀφιεμένων τῶν βελῶν εἰς τὰ προσαγόμενα μηχανήματα καὶ ἵνα μήθ᾽ ὑπὸ τῶν κριῶν μήθ᾽ ὑπὸ τῶν πετροβόλων τυπτόμενοι μηδὲν πάσχωσιν· (4) αἱ μὲν γὰρ γινόμεναι κατὰ τὰς πλευρὰς καταφοραὶ τῶν πληγῶν ἰσχυραί, αἱ δὲ περὶ τὴν ἐκκειμένην γωνίαν περικλώμεναι παντελῶς ἀσθενεῖς ἔσονται.
(5) Ἁρμόσει δέ πως τοὺς περιφερεῖς καὶ τοὺς τετραγώνους ὥσπερ νῦν οἰκοδομεῖσθαι καὶ τίθεσθαι· (6) τοὺς δὲ κατὰ τοὺς πυλεῶνας ἑξαγώνους δεῖ συντελεῖν, ἵν᾽ αἵ τε γωνίαι ἧττον θραύωνται καὶ μὴ παραπίπτοντα τὰ βέλη καὶ συμφερόμενα ἅπαντα πρὸς τὰς ἐξόδους συντρίβῃ τὰς πύλας καὶ δυσεκπορεύτους κατασκευάζῃ, τάς τε ἐπιστάσεις τῶν βελῶν ἔχῃς πανταχόθεν. (7) Ἐὰν δὲ [80] πλινθίνους οἰκοδομῇς, τετραγώνους δεῖ ποιεῖν καὶ προεκτιθέναι μικρὸν κατ᾽ ὀξεῖαν γωνίαν, κατὰ κύκλου τμῆμα συνάπτοντας τοῖς μεσοπυργίοις, ὥστε ἀπαρτίζειν αὐτῶν τὴν βάσιν τῷ πέρατι τῶν μεταπυργίων. (8) Ἵνα δὲ μὴ λαμβάνωσιν κατάκρουσιν μηδ᾽ ἡντιναοῦν ἐκ πληγῆς μηδ᾽ ἠστινοσοῦν, ἐν μολίβῳ καὶ σιδήρῳ καὶ γύψῳ οἱ ἔσχατοι τῶν λίθων πρὸς ἀλλήλους δεθέντων, πρὸς τὸ τοὺς πετροβόλους παραφόρους γινομένους μὴ δύνασθαι τὰς ἐπάλξεις ἀποκόπτειν.

A

[79] <Philon to Ariston, greetings.>

(1) <…> First, it is necessary that those who are building towers <and walls>, once they have dug as far as rock or water or some (other) bottom and have safely firmed up this place as much as can be, should lay the foundations in mortar, in order that the (constituent) walls be not shattered within the foundations and the walls (as a whole) be not undermined.

(2) Secondly, the towers need to be built in accordance with places which are appropriate. Some of them should be rounded on the outside, and internally having a surface as might be that of a cylinder cut in two (vertically) at the base. (3) But make others hexagonal and pentagonal and tetragonal, thrusting (these last) out at one corner, in order that they may protect one another, with projectiles being discharged from the flanks at the machines being brought against them, and in order that they suffer no harm when struck, neither by rams nor by rock-projectors; (4) for whereas the impacts of blows sustained on the faces will be strong, those ricocheting round the outlying corner will be altogether feeble.
(5) It will be somehow appropriate to build and to position the rounded and the tetragonal (towers) just as nowadays. (6) But the ones at gateways it is necessary to effect as hexagonal, in order that the corners may be broken less and that projectiles falling and being concentrated all together at the exits do not damage the gates and render them difficult to leave by, and also (in order that) you may have emplacements of artillery (facing an attack) from every quarter. (7) But if [80] you build (towers) of brick, it is necessary to make them tetragonal and to extend them outwards a little at a sharp corner, attaching them at an arc of a circle to the curtains so as to have their back make a fit with the extremity of the curtains. (8) In order that they do not receive a shock of any kind as the result of a blow of any kind, let the last of the stones (in stone towers) be bound to each other in lead and iron and mortar, with a view to the rock-projectors being made to deviate and being unable to sever the parapets.

(9) Τὰ δὲ μεταπύργια ἐπικαμπίους ἔχοντα ἐκ τῶν πλαγίων τοίχους, οἳ ἀπὸ μέσων τῶν πύργων ἀχθέντες τὸ μὲν πλάτος ἐχέτωσαν δίπηχυ <τὸ δὲ …>, ἵνα μὴ οἱ ἐκπορευόμενοι τιτρώσκωνται μηδὲ κατὰ τὰς διόδους τὰ βέλη φερόμενα τὰς πυλίδας ἐκκόπτῃ.

(10) Ἀπεχέτω δὲ τὸ τεῖχος ἀπὸ τῶν οἰκιῶν ἑξήκοντα πήχεις, ἵνα ῥᾳδίως ᾖ παραφέρειν τοὺς λίθους καὶ πάροδον ἔχῃς τοῖς βοηθοῦσιν καὶ ταφρείαν ἔν<δο>θεν ἱκανήν, ἐάν τι δέῃ.

(11) Τὰ δὲ πλάτη ποιητέον τῶν τειχῶν οὐκ ἔλαττον ἢ δέκα πηχῶν, τιθέντας καὶ τοὺς λίθους ὀρθίους ἐν γύψῳ, μάλιστα μὲν ἐκ κραταιοῦ λίθου τὰ ἐπικαιρότατα τῶν μεταπυργίων συντελοῦντας, εἰ δὲ μή, ὀξεῖς· ὡς ἥκιστα γὰρ πείσεται ὑπὸ τῶν λιθοβόλων. (12) Μὴ ἐλάσσω δὲ τῷ ὕψει οἰκοδομεῖσθω ἢ εἰκοσιπήχη, ἵνα αἱ πρὸς αὐτὸ κλίμακες προσαγόμεναι μὴ ἐξικνῶνται [τοῖς τείχεσιν].

(13) Ἐμβλητέον δέ ἐστιν εἰς τὰ τείχη καὶ τοὺς πύργους ξύλα δρύινα διὰ τέλους συνεχῆ διὰ τεττάρων πηχῶν, ἵνα ὑπὸ τῶν λιθοβόλων ἐὰν κατά τι πονέσῃ, ῥᾳδίως ἐπισκευάζωμεν αὐτά.

(14) Ποιεῖται δὲ <τῶν μεταπυργίων> τὰ μὲν κατάστεγα καὶ ἐπάλξεις ἔχοντα, οἷα ἂν συμφέρῃ. (15) Τινὰ δὲ [τῶν μεταπυργίων] συντελεῖται ἐν τοῖς ἁρμόζουσι τόποις ἐπάλξεις μὲν ἔχοντα, παρόδους δὲ οὔ, ἀλλ᾽ ἀπὸ τῶν ἐνῳκοδομημένων ἱκρίων τοῖς τοίχοις ἐπιβολὰς ξύλοις καὶ σάνισιν ἔχοντα, ἵνα κατὰ τὰς γινομένας πολιορκίας λαμβάνωνται <καὶ> ὅταν δέῃ ἐφοδεύειν ἢ διακινδυνεύειν ἐπ᾽ αὐτῶν μηδὲν ἡμᾶς κωλύῃ, καὶ πάλιν ἀφελοῦσι τὰ ξύλα ὅταν ἁρμόττῃ, βραχεῖά τις φυλακὴ καταλείπηται· (16) εὐριεύσαντες γὰρ αὐτῶν οἱ πολέμιοι ἢ πάλιν ἀπίασιν, οὐ δυνάμενοι εἰς τὴν πόλιν παρεμπεσεῖν, ἢ βραχύν τινα χρόνον ἐπὰν μείνωσιν, ὑπὸ τῶν βελῶν τυπτόμενοι ἀπολοῦνται. (17) Τινὰ δὲ καθάπερ ἐν Ῥόδῳ εἰς ψαλίδας συγκλειόμενα <…> πλάτη τε ἔχουσιν αἱ πάροδοι ἐπταπήχη καὶ κάτωθεν φυλακτήρια ἑπτάκλινα, ὧν οἱ τοῖχοι οἱ μὲν ὀρθοὶ ἔσον-

(9) When curtains have jog walls (originating) out of the flanks, let these, brought from the middles of the towers, have a breadth of two cubits (0.924 m.) <and a (?)height of …>, in order that those going out on sorties are not wounded and that projectiles being despatched against the ways through do not break open the posterns.

(10) Let the wall stand away from the houses by sixty cubits (27.72 m.), in order that transporting stones may be easily done and that you may have a way along for reinforcements and ample trenching inside, if any is needed.

(11) The breadt of walls are to be made no less than ten cubits (4.62 m.), laying the stones, too, e on in mortar; in particular completing the most important (parts) of the curtain of (particularly) sturdy stone, or if not, (using) sharp ones; for these are ha least by stone-projectors. (12) Let it be built no less than twenty cubits (9.24 height, in order that ladders brought against it do not reach (the top).

(13) Oak timbers are to be inserted into the towers end-on continuously every four cubits (1.848 m.), in order th age is inflicted by stone-projectors we may easily attend to it.

(14) Some <curtains> are made roofed-over and with parapets, v are expedient. (15) But certain ones in appropriate places are c pets but not (permanent) ways along; instead they have suppo bers and planks, (emanating) from the (?)scaffolding built-in that they may be undertaken in accordance with the sieges nothing prevents us, if need be, from using them for patro timbers are removed again when that is appropriate, and a (16) for if the enemy gain control of the(se areas), they w they are unable to break into the city or, if they do rema be struck by projectiles and perish. (17) But certain closed-together into vaults <…> and the ways along breadths and seven-bed guardrooms below, of which

ται δεκαπήχεις τῷ τε μήκει καὶ τῷ πάχει· (**18**) οἱ δὲ
πλάγιοι μῆκος μὲν ἔχουσιν τὸ ἴσον τοῖς ὀρθοῖς,
πλάτος δὲ τρίπηχυ. (**19**) Οὕτω δὲ καὶ οἰκοδομηθέντων
[*81*] τὸ τε ἀνάλωμα ἔλαττον ἔσται, καὶ οἱ μὲν δεκαπή-
χεις ὑπὸ τῶν λιθοβόλων οὔθεν πείσονται, οἱ δὲ τρι-
πήχεις τὸ πάχος ὄντες ἐάν τι πάσχωσιν ὑπὸ τῶν
πληγῶν, ταχὺ ἀποστερεώσομεν τὸ φυλακτή-
ριον τοῦτο.

(**20**) Ὡσαύτως δὲ καὶ τοὺς πύργους οἰκοδομήσομεν
ἐκ λίθων οἵων εἰρήκαμεν, τιθέντες ὀρθίους αὐτοὺς
ἐν γύψῳ καὶ τὰ πλάτη τῶν τοίχων οὐκ
ἐλάττω ποιοῦντες ἢ δεκαπήχη καὶ καταλι-
πόντες θυρίδας ἐκ τῶν πλαγίων τοίχων ἔξω-
θεν στενὰς καὶ ἔσωθεν εὐρείας, ἐκ δὲ τοῦ μέ-
σου στενὰς καὶ καταξύρους ἐκ τοῦ κάτωθεν μέ-
ρους, ἵνα μὴ τιτρώσκωνται οἱ ἔνδον καὶ παρα-
τεινομένων <τῶν> βελῶν ἀφιῶσι τούς τε καταπάλτας
καὶ τοὺς πετροβόλους οὐ προαιροῦνται. (**21**) Δεῖ <δέ> εἶναι
τὰς θυρίδας τοῖς ἀφιεμένοις καταπάλταις καὶ
πετροβόλοις ἐν <τοῖς τοίχοις> τῶν πύργων, ἐν οἷς αἱ βελοστάσεις
ἐκ τοῦ ἐδάφους κατασκευασθήσονται, ἵνα τὰ προσ-
αγόμενα μηχανήματα ἐάν τε πρός τινα τῶν <μετα->
πυργίων ἐξ ἐναντίας προσάγηται, ἐάν τε ἐπί τινα τῶν
ἐκκειμένων πύργων ἐπιστρέφῃ, συνεργοῦντες
ἀλλήλοις <ἀμύνωσιν> οἱ πύργοι φερομένων τῶν λιθοβόλων
ἐκ τῶν πλαγίων τοίχων [καὶ τῶν μεταπυργίδων],
ἐν οἷς αἱ θυρίδες κατασκευάζονται οἵας εἰρήκαμεν.
(**22**) <…> καὶ τοξικαὶ αἱ μὲν πλάγιαι αἱ δὲ ὀρ-
θαὶ ἔξω τὰ στενὰ ἔχουσαι, ὅπως ἂν τούς τε πλη-
σιάζοντας τραυματίζωσι καὶ καταγνύωσι τὰς
προστιθεμένας δοκίδας καὶ τὰ μηχανήματα, αὐ-
τοὶ δὲ μηδὲν δεινὸν πάσχωσι· (**23**) σεσιδηρωμένας
γὰρ καὶ ἀμφιπλεύρους τὰς θυρίδας αὐτῶν ποιή-
σομεν, ἵνα μὴ συντρίβωνται ὑπὸ τῶν λιθο-
βόλων· (**24**) ἔτι δὲ οὐ ῥᾳδίως τὰ τῶν ἐναντίων βέ-
λη εἰς τὰ πλάγια τὴν ἔφιξιν ποιήσονται.
(**25**) Τοιαύτης δ᾽ οὔσης τῆς τοιχοποιίας τῶν πύργων
τὰς διόδους ὡς μεγίστας καὶ ψαλιδοειδεῖς ποιή-
σομεν πρὸς τὸ ῥᾳδίως τοὺς πετροβόλους εἰσφέ-
ρειν καὶ μεταφέρειν ὅταν δέῃ. (**26**) Δεῖ δὲ τοὺς μὲν κατὰ
τὰς εἰσαγωγὰς πύργους τῶν μηχανημάτων ὑψη-
λοὺς καὶ ἰσχυροὺς οἰκοδομεῖν, τοὺς δὲ ἄλλους ὅσον
κλίμακι <μὴ> προσικέσθαι· (**27**) οἱ γὰρ ἄγαν ὑψηλοὶ δυσ-
χρηστότεροί εἰσιν καὶ θᾶσσον ὑπὸ τῶν πετροβόλων

be ten cubits (4.62 m.) in both length and thickness; (**18**) the lateral (sides) have a length equal to the forward-leading, but a three-cubit (1.386 m.) breadth. (**19**) If they have been built thus, [*81*] the expense will be less, and the ten-cubit ones will not be affected by stone-projectors, while if the ones three-cubits in thickness suffer any ill-effects from the blows we will swiftly strengthen this (affected) guardroom.

(**20**) Likewise too we will build the towers, out of stone of the kinds we mentioned, positioning them end-on in mortar and making the breadths of the sides no less than ten-cubit (4.62 m.) and leaving windows, (looking) out of the flanking sides, that are narrow on the outside and broad on the inside, but (alternatively) narrow in the middle and shaved-down in the bottom part, in order that the men inside are not wounded and that, with the (enemy) artillery being (over-)extended, they may discharge both their catapults and their rock-projectors where they choose. (**21**) It is also necessary that the windows for catapults and rock-projectors being discharged are in <the sides> of towers in which artillery-emplacements will have been constructed on a (solid) bottom, in order that if the machines being brought forward are brought forward towards any of the curtains, or if they are directed against any of the protruding towers, the towers <may defend> one another by working together, with stone-projectors being deployed out of the flanking sides, in which the windows are made of the kinds we have mentioned. (**22**) <…> and (windows) for archers, some flankwise and some frontal, with their narrow (parts) outwards, so that (the defenders) would wound those who are coming close and would shatter the screens that are being put in place and the machines, but suffer nothing terrible themselves; (**23**) for we will make the windows of the(se towers with shutters) ironclad and two-sided, in order that they are not crushed by stone-projectors; (**24**) besides, the enemies' projectiles will not easily effect their reach (by penetrating) into the flanks.

(**25**) With the fortification-system being of such a kind we will make the doorways of the towers as large as possible and vault-shaped, with a view to easily carrying in rock-projectors and, when needful, moving them. (**26**) It is necessary to build tall and strong those towers which must accommodate the deployments of (enemy) machines, but the others as (tall as) not to be reached by a ladder; (**27**) for ones which are too tall are rather hard to use and collapse sooner when struck by rock-

(**9**) Τὰ δὲ μεταπύργια ἐπικαμπίους ἔχοντα ἐκ τῶν πλαγίων τοίχους, οἳ ἀπὸ μέσων τῶν πύργων ἀχθέντες τὸ μὲν πλάτος ἐχέτωσαν δίπηχυ <τὸ δὲ …>, ἵνα μὴ οἱ ἐκπορευόμενοι τιτρώσκωνται μηδὲ κατὰ τὰς διόδους τὰ βέλη φερόμενα τὰς πυλίδας ἐκκόπτῃ.

(**10**) Ἀπεχέτω δὲ τὸ τεῖχος ἀπὸ τῶν οἰκιῶν ἑξήκοντα πήχεις, ἵνα ῥᾳδίως ᾖ παραφέρειν τοὺς λίθους καὶ πάροδον ἔχῃς τοῖς βοηθοῦσιν καὶ ταφρείαν ἔν<δο>θεν ἱκανήν, ἐάν τι δέῃ.

(**11**) Τὰ δὲ πλάτη ποιητέον τῶν τειχῶν οὐκ ἔλαττον ἢ δέκα πηχῶν, τιθέντας καὶ τοὺς λίθους ὀρθίους ἐν γύψῳ, μάλιστα μὲν ἐκ κραταιοῦ λίθου τὰ ἐπικαιρότατα τῶν μεταπυργίων συντελοῦντας, εἰ δὲ μή, ὀξεῖς· ὡς ἥκιστα γὰρ πείσεται ὑπὸ τῶν λιθοβόλων. (**12**) Μὴ ἐλάσσω δὲ τῷ ὕψει οἰκοδομεῖσθω ἢ εἰκοσιπήχη, ἵνα αἱ πρὸς αὐτὸ κλίμακες προσαγόμεναι μὴ ἐξικνῶνται [τοῖς τείχεσιν].

(**13**) Ἐμβλητέον δέ ἐστιν εἰς τὰ τείχη καὶ τοὺς πύργους ξύλα δρύινα διὰ τέλους συνεχῆ διὰ τεττάρων πηχῶν, ἵνα ὑπὸ τῶν λιθοβόλων ἐὰν κατά τι πονέσῃ, ῥᾳδίως ἐπισκευάζωμεν αὐτά.

(**14**) Ποιεῖται δὲ <τῶν μεταπυργίων> τὰ μὲν κατάστεγα καὶ ἐπάλξεις ἔχοντα, οἷα ἂν συμφέρῃ. (**15**) Τινὰ δὲ [τῶν μεταπυργίων] συντελεῖται ἐν τοῖς ἁρμόζουσι τόποις ἐπάλξεις μὲν ἔχοντα, παρόδους δὲ οὔ, ἀλλ᾽ ἀπὸ τῶν ἐνῳκοδομημένων ἱκρίων τοῖς τοίχοις ἐπιβολὰς ξύλοις καὶ σάνισιν ἔχοντα, ἵνα κατὰ τὰς γινομένας πολιορκίας λαμβάνωνται <καὶ> ὅταν δέῃ ἐφοδεύειν ἢ διακινδυνεύειν ἐπ᾽ αὐτῶν μηδὲν ἡμᾶς κωλύῃ, καὶ πάλιν ἀφελοῦσι τὰ ξύλα ὅταν ἁρμόττῃ, βραχεῖά τις φυλακὴ καταλείπηται· (**16**) κυριεύσαντες γὰρ αὐτῶν οἱ πολέμιοι ἢ πάλιν ἀπίασιν, οὐ δυνάμενοι εἰς τὴν πόλιν παρεμπεσεῖν, ἢ βραχύν τινα χρόνον ἐπὰν μείνωσιν, ὑπὸ τῶν βελῶν τυπτόμενοι ἀπολοῦνται. (**17**) Τινὰ δὲ καθάπερ ἐν Ῥόδῳ εἰς ψαλίδας συγκλειόμενα <…> πλάτη τε ἔχουσιν αἱ πάροδοι ἐπταπήχη καὶ κάτωθεν φυλακτήρια ἑπτάκλινα, ὧν οἱ τοῖχοι οἱ μὲν ὀρθοὶ ἔσον-

(**9**) When curtains have jog walls (originating) out of the flanks, let these, brought from the middles of the towers, have a breadth of two cubits (0.924 m.) <and a (?)height of …>, in order that those going out on sorties are not wounded and that projectiles being despatched against the ways through do not break open the posterns.

(**10**) Let the wall stand away from the houses by sixty cubits (27.72 m.), in order that transporting stones may be easily done and that you may have a way along for reinforcements and ample trenching inside, if any is needed.

(**11**) The breadths of walls are to be made no less than ten cubits (4.62 m.), laying the stones, too, end-on in mortar; in particular completing the most important (parts) of the curtains out of (particularly) sturdy stone, or if not, (using) sharp ones; for these are harmed least by stone-projectors. (**12**) Let it be built no less than twenty cubits (9.24 m.) in height, in order that ladders brought against it do not reach (the top).

(**13**) Oak timbers are to be inserted into the walls and the towers end-on continuously every four cubits (1.848 m.), in order that if any damage *is* inflicted by stone-projectors we may easily attend to it.

(**14**) Some <curtains> are made roofed-over and with parapets, where ones like that are expedient. (**15**) But certain ones in appropriate places are completed with parapets but not (permanent) ways along; instead they have supports (made) with timbers and planks, (emanating) from the (?)scaffolding built-in to the sides, in order that they may be undertaken in accordance with the sieges that occur <and> that nothing prevents us, if need be, from using them for patrolling or for fighting. The timbers are removed again when that is appropriate, and a token guard left on duty: (**16**) for if the enemy gain control of the(se areas), they will either withdraw because they are unable to break into the city or, if they do remain for a short time, they will be struck by projectiles and perish. (**17**) But certain (curtains), as in Rhodes, are closed-together into vaults <…> and the ways along have seven-cubit (3.234 m.) breadths and seven-bed guardrooms below, of which the forward-leading sides will

τυπτόμενοι καταπίπτουσιν οὐ δυνάμενοι τὰ βάρη φέρειν. **(28)** Ὥστε μᾶλλον σπουδαστέον ἐστὶν αὐτῶν τοὺς τοίχους παχυτέρους [ποιεῖν] καὶ αὐτοὺς ποιεῖν καὶ τὴν εἰς τὰ ὕψη δαπάνην γινομένην εἰς ταῦτα ἀναλίσκειν.

(29) Ἐν δὲ τοῖς μεταπυργίοις πᾶσι καὶ τοῖς πύργοις καθ' ὃ ἂν αἱ πληγαὶ μάλιστα γίνωνται τῶν λιθοβόλων, λίθοι ὡς σκληρότατοι ἐκτίθενται προέχοντες ὅσον σπιθαμὴν καὶ διεστηκότες ἀπ' ἀλλήλων τοσοῦτον, ὥστε εἰς τὴν ἀνὰ μέσον χώραν [*82*] ταλαντιαῖον πετροβόλον μὴ παραδέχεσθαι, ἵνα μὴ ὑπ' αὐτῶν τὰ τείχη μηδὲν πάσχῃ.

(30) Τῶν δὲ τειχέων ἁπάντων αἱ ἐκθέσεις καὶ ἐγκλίσεις καὶ τὰ ἐπικάμπια καὶ αἱ <εὐθυω>ρίαι ἁρμοττόντως τοῖς ὑπάρχουσι τόποις λαμβάνονται.

(31) <...> καὶ λίθοι ἀργομέτωποι πεπελεκημένοι ἐπὶ μῆκος τίθενται.

(32) Καὶ κάτωθεν τῶν τειχῶν καὶ τῶν προτειχισμάτων ὡς μεγίστοις καὶ πλείστοις βέλεσιν αἱ βελοστάσεις κατασκευάζονται, αἱ μὲν [ὀρυκταὶ] ἐπίπεδοι [καὶ κατώρυχοι], αἱ δὲ ὑπόγειοι πρὸς τὸ εὐρυχωρίαν ἔχειν πολλὴν καὶ τοὺς ἀφιέντας μὴ τιτρώσκεσθαι καὶ αὐτοὺς ἀδήλους τοὺς ἐναντίους τραυματίζειν, καὶ ὅταν οἱ πολέμιοι πλησιάζωσι, μὴ ἀχρείους γίνεσθαι τοὺς καταπελταφέτας ἀδυνατοῦντας καταστρέφειν.

(33) Ἔτι δὲ πυλίδες πολλαὶ καταλείπονται ἐκ τῶν πλαγίων πρὸς τὸ ῥᾳδίως ἐπεξέρχεσθαι [ἢ] καὶ πάλιν ἀποχωροῦντας γυμνὰ μὴ φαίνειν ἐπ' ἀσπίδα ποιουμένους τὴν μεταστροφήν, καὶ τὸν ἐξεληλυθότα λόχον κατὰ τὴν πρώτην πυλίδα κατὰ τὴν δευτέραν συντελοῦντα τὴν εἴσοδον, ὁμοίως δὲ καὶ τοὺς ἄλλους πάντας οὕτω ποιουμένους τὰς ἀποχωρήσεις. **(34)** Τῶν δὲ πυλίδων αἱ μὲν σκολιαί, αἱ δὲ κλίσιν ποιοῦνται. **(35)** Πρὸ πασῶν δὲ αὐτῶν οἰκοδομήματα κατασκευάζεται, ἵνα δυσέμπρηστοί τε ὦσι καὶ ὑπὸ τῶν πετροβόλων μὴ συντρίβωνται καὶ οἱ πολέμιοι μὴ πλησιάζωσιν αὐταῖς, ἐκ δὲ τῆς πόλεως ὅταν μέλλωσιν ἐπεξιέναι τινές, μὴ συμφανὲς ᾖ τοῖς πολεμίοις.

projectors, being unable to bear the weights. **(28)** Consequently, care is to be taken, rather, to make their sides thicker and to spend on these (thicknesses) the cost (that would have been) incurred on the heights.

(29) In all curtains and towers where the blows of stone-projectors are likeliest to occur, stones as hard as possible are placed forward – protruding as much as a span (23.1 cm.), separated from each other by such a distance that into the intervening space [*82*] (a shot from) a one-talent (26.2 kg.) rock-projector does not penetrate – in order that the walls suffer no damage from them.

(30) In all walls the salients and re-entrants and the jogs and the straight-line sections take account appropriately of the existing terrains.

(31) <...> and stones with rough-hewn faces cut by axe are placed lengthways.

(32) Also, beneath the walls and the outworks artillery-emplacements are (to be) prepared, for artillery as large and as plentiful as possible: some at ground-level, others below ground, with a view to having plenty of space and ensuring that the operatives are not wounded and, out of sight themselves, wound the opponents, and (in order that) when the enemy come close the catapulteers do not become unserviceable by being unable to lower their aim.

(33) Furthermore, numerous posterns are left (issuing) out of the flanks with a view to emerging easily and, when returning, not appearing exposed by making the turn towards the shield side; the contingent which has left by the first postern re-enters by the second, and similarly all the others complete their withdrawals thus. **(34)** Some of the posterns are oblique, others make an angle. **(35)** In front of them all, built structures are prepared, in order that they may be difficult to set on fire and will not be crushed by rock-projectors and the enemy will not come close to them, and that when some (of the defenders) are intending to make a sortie out of the city, (this) would not be obvious to the enemy.

(**36**) Αἱ δὲ ὀρυττόμεναι τάφροι, ἐὰν μὴ ὕπομβρος ᾖ
ὁ τόπος, κατάξηροί τε καὶ ὑπόνομοι κατὰ τοὺς ἁρμότ-
τοντας τόπους γίνονται, ἵνα ὅταν συγχώνωνται, πάντα
τὰ ἐμβαλλόμενα τὰ μὲν ἡμέρας τὰ δὲ νυκτὸς ὑπεξά-
γηται πάλιν ὑπὸ τῶν ἔνδον πολιορκουμένων. (**37**) Αἱ δὲ
χαρακώσεις ἔξω τῆς <τάφρου τῆς> προσ<εχῶς τὴν παρέκτασιν παρὰ> τὸ τείχισμα λαμβανού-
σης ὄρθιαι πᾶσαι συντελοῦνται παρὰ <… πρὸς> τὸ τὸν χά-
ρακα δυσυπέρβατον καὶ δυσδιάσπαστον γενέσθαι·
δυσυπέρβατον μὲν διὰ τὸ μηδαμῶς [μήτε] ὑπέρ-
βασιν ἔχειν τοῖς σκέλεσι· δυσδιάσπαστον δὲ διὰ τὸ
καὶ ἑλκόμενον στάσιν ἔχειν καὶ ὑπὸ τῶν γινομένων
τοῖς καλωδίοις ἐνάψεων πρότερον ἂν συντρι-
βῆναι τὸν καλών, ὅπερ γένοιτο ἄν, ἢ ἑλκυσθῆναι
τὸν σκόλοπα τελέως. (**38**) Τίθενται δὲ [καὶ] εἰς τὸ στάδιον
οἱ μέσοι τοῖς μεγέθεσιν ὄντες χάρακες, ,αχ΄.

(**39**) Ἑτέρα δέ τίς ἐστιν πυργοποιία ταύτης οὐθὲν
χείρων ἐκ τῶν ἡμικυκλίων συνισταμένη, ὡς τὰ
κοῖλα πρὸς τοὺς πολεμίους φαίνεσθαι· (**40**) ἐν ᾗ τὰ
πέρατα τῶν τμημάτων δεῖ συνάπτειν τοῖς πύρ-
γοις, ὥστε ἀπαρτίζειν ταῖς γωνίαις αὐτῶν καὶ λαμ-
βάνειν ἀπ᾽ ἀλλήλων διάστημα τῆς ἔξω περιφε-
ρείας ὅσον ἂν ᾖ τὸ πλάτος τοῦ ἔσω τοίχου τῆς βά-
σεως. (**41**) Ἁπάντων δὲ τὰς δοκοὺς ἐπὶ τοὺς ὀρθοὺς
τοίχους ἐπιθετέον ἐστίν, ἵνα ἐάνπερ ὁ πρὸς τοὺς
[*83*] πολεμίους καθήκων τοῖχος τυπτόμενος πέσῃ, μέ-
νωσιν αἱ ὀροφαὶ καὶ δυνώμεθα πάλιν οἰκοδο-
μεῖν αὐτούς. (**42**) Ποιητέον δὲ καὶ πυλίδας παρ᾽ αὐτούς,
ὥστε μήτε ψιλὰ τοὺς ἐκπορευομένους φαίνειν
μήτε ὑπὸ τῶν λιθοβόλων αὐτὰς ἐκκόπτεσθαι.
(**43**) Τὴν δὲ ἄλλην οἰκοδομίαν ἀκολούθως τοῖς πρό-
τερον δεδηλωμένοις κατασκευαστέον.

(**44**) Ταύτῃ δὲ <ἡ>
πριονωτὴ παραπλήσιος οὖσα τυγχάνει, ἣν Πο-
λύειδόν φασιν εὑρεῖν τὸν μηχανοποιὸν ἐν τῇ με-
τα<θέσει κα>τά τινας τῶν ἐπικαίρων τόπων, παρ᾽ οἷς καὶ πύρ-
γους οἰκοδομεῖν πενταγώνους κατὰ τὰ διαλείμ-
ματα τῶν μεσοπυργίων, ἀφ᾽ ὧν, καθάπερ εἴρη-
ται πρότερον, δοκῶν ἐπιβληθεισῶν ταῦτα τὰ κα-
τασκευάσματα ἔσται.

(**45**) Παρὰ δὲ ταύτην ἄλλην τινὲς τειχοποιίαν
δοκιμάζουσιν, ἐν ᾗ μικρὸν ἐκκλίνοντα τὰ μετα-

(**36**) Trenches being dug – unless the site is subject to inundation – are both bone-dry and, in accordance with the appropriate terrains, served by tunnels, in order that when they are filled in (by the enemy) all the deposits may be taken out again, some during the day and others at night, by those being besieged within. (**37**) The palisadings outside the <trench which> has <its extension along> the rampart are all completed (with their stakes) upright, along <…, with a view to> the palisade being difficult to cross and difficult to uproot: difficult to cross because it has in no way a crossing for the legs; difficult to uproot because even when being wrenched it stays stable and, because of the attachments made with cords, the rope would have to break – as might happen – before the stake could be pulled fully out. (**38**) Positioned per stade (184.8 m.) are 1600 pales of medium sizes.

(**39**) There is another fortification-system, not inferior to this, comprised out of semicircles, such that their hollows face the enemy; (**40**) in this it is necessary that the extremities of the arcs adjoin the towers in such a way as to make a fit onto their corners and to create between one another an interval in the outer curvature equal to whatever may be the breadth of the internal side of the (tower's) back. (**41**) The joists of all (towers) are to be positioned on the(ir) forward-leading sides, in order that if the [*83*] side facing the enemy were to be struck and fall, the roofs would remain and we would be able to build the (towers) again. (**42**) Also to be made are posterns beside them, so that those going out on sorties do not expose their unprotected parts and (the posterns) are not broken open by stone-projectors. (**43**) The rest of the building is to be prepared in conformity with the previous instructions.

(**44**) Similar to this is the serrated (system), which they say Polyidus the engineer invented in the <alteration made at> certain advantageous sites, where also pentagonal towers should be built in accordance with the interstices of the curtains; from these (towers), just as stated previously, with joists in place, these preparations will be made.

(**45**) Besides this, some approve another fortification-system, in which the curtains

πύργια ᾠκοδόμηται ἑκατὸν πηχῶν τὸ μῆκος, τὸ
δὲ πάχος ιβ΄, τὸ δὲ ὕψος ἓξ ὀργυιῶν· (**46**) τὸ
δὲ πρὸς τοὺς πολεμίους καθῆκον τοιχόκρανον
δεῖ μείουρον διπλοῦν κατασκευάζειν, ἵνα ὑπὸ
τῶν λιθοβόλων τυπτόμενον μηδὲν πάσχῃ, ἀπέ-
χον θάτερον θατέρου πήχεις ὀκτώ· ἐπ᾽ ἔλαττον
δὲ δώδεκα (**47**) ἄνωθεν εἰς ψαλίδας συγκλεισθέν-
των ἢ δοκῶν ἐπιτεθεισῶν οἰκοδομεῖται φυλακτή-
ρια· ἐπὶ δὲ τῶν διεξόδων πυλίδες ἐπιτίθενται. (**48**) Κατὰ
δὲ τὸ μέσον αὐτῶν πύργοι <ἢ> βάρεις οἰκοδομοῦν-
ται κατὰ τοὺς ἐπικαίρους τόπους πεντάγωνοι. (**49**) Συμ-
βαίνει οὖν τῇ μὲν γίνεσθαι διπλοῦν <τὸ> τεῖχος,
τῇ δὲ πύργοις πεφυλαγμένον, ὥστε μηδὲν δει-
νὸν πάσχειν· (**50**) τάς τε γὰρ προστιθεμένας δοκίδας
καὶ τὰ προσαγόμενα μηχανήματα καὶ τὰς
προσῳκοδομημένας στοὰς ἐκ τοῦ πλαγίου τυ-
πτομένας τοῖς λιθοβόλοις [καὶ κριοῖς] τὰς μὲν
συντρίβειν, τὰς δὲ ῥᾳδίως καταβάλλειν· (**51**) καὶ
τοὺς ὑπορύττοντας καὶ τοὺς ὑπ᾽ αὐτοὺς ὄντας
εὐχερῶς ἀπολεῖν, ἔτι δὲ βρόχους περιβάλλον-
τας περὶ τοὺς κριοὺς ῥᾳδίως καθέξειν ἢ κυ-
ριεύσειν αὐτῶν· (**52**) τούς τε προσερχομένους εἰς
τὸ τεῖχος εἰς τὰ ψιλὰ τυπτήσειν καὶ αὐτοὺς
εὐχερῶς ὑπεξελεύσεσθαι καὶ πάλιν τὰς
ἀποχωρήσεις ἀσφαλῶς ποιήσεσθαι μὴ διδόν-
τας τὰ ψιλὰ τοῖς πολεμίοις. (**53**) Ταῦτα δὲ πάντα
συμβήσεται καὶ ἐν ταῖς ἄλλαις τειχοποιίαις.
(**54**) Δεῖ <δὲ> τὰ προτειχίσματα αὐτῶν ὡς ἰσχυρότατα ποιεῖν
τὸν αὐτὸν τρόπον τοῖς τείχεσιν οἰκοδομοῦντας·
τὰς δ᾽ ἄλλας οἰκοδομίας καὶ τὰς χαρακώσεις
οἵας πρότερον εἰρήκαμεν ποιητέον.

(**55**) Εὐχερεστά-
τη δέ ἐστι τειχοποιία καὶ ἀσφάλειαν ἱκανὴν ἔ-
χουσα, ἐν ᾗ τὰ μεταπύργια λοξὰ οἰκοδομεῖται·
(**56**) καὶ πύργοι ἐν αὐτῇ κατασκευάζονται τὴν μὲν
ὀξεῖαν, τὴν δὲ ἀμβλεῖαν γωνίαν ποιοῦντες τὰς
[*84*] προσηκούσας πρὸς τὸ τεῖχος· (**57**) οὕτω γὰρ οἰκοδο-
μηθέντες κἂν προσαγομένων τῶν μηχανημά-
των ἀλλήλοις ἀμύνειν δύναιντο. (**58**) Τὸν αὐτὸν δὲ τρό-
πον καὶ ἐν τοῖς στρατοπέδοις τειχοποιητέον ἐστίν, ἐὰν
προσδέχηται πολιορκίαν τινά.

(**59**) Ἐν δὲ ταῖς
ἀρχαίαις τειχοποιίαις δεῖ τοὺς πύργους προεκτι-

are built – bending slightly outwards – a hundred cubits (46.2 m.) in length, 12 (5.544 m.) in thickness, six fathoms (11.1 m.) in height; (**46**) it is necessary to prepare the coping which faces the enemy tapering (and) doubled, in order that when struck by stone-projectors it suffers no damage, the interval between the one and the other being eight cubits (3.696 m.); at least twelve (cubits) (5.544 m.) (**47**) upwards closed-together into vaults or with joists overlaid, guardrooms are built; and posterns are positioned at the exits. (**48**) In the midst of these (curtains) pentagonal towers or bastions are built at advantageous places. (**49**) The outcome therefore is that the wall is on the one hand doubled, on the other protected by towers, so that it suffers nothing terrible; (**50**) for the (enemy) screens being put forward and the machines being brought up and the stoas (already) built in advanced positions are struck from the side by stone-projectors [and rams], some being crushed, others easily overthrown; (**51**) and the tunnellers and those under them are readily destroyed, besides the fact that by throwing nooses round the (enemy) rams one can easily hold them back or gain control of them; (**52**) and the men advancing on the wall you will strike on their unprotected parts and can readily go out to face them and to make your retreats again safely without presenting your own unprotected parts to the enemy. (**53**) All these things will obtain in the other fortification-systems too. (**54**) It is necessary to make their outworks as strong as possible by building them in the same way as the walls; the other building-operations and the palisadings are to be done in the ways we have previously stated.

(**55**) There is a(nother) fortification-system very practicable and affording ample security, in which the curtains are built slanting; (**56**) and towers in it are prepared which make one angle acute and one obtuse [*84*] when they meet the wall; (**57**) for when built thus they can defend one another even if the (enemy) machines are being brought forward. (**58**) In the same way there must be fortification in camps too, if a siege is expected.

(**59**) In the old fortification-systems it is necessary

θέναι κατὰ μίαν γωνίαν, τὰ δὲ μεσοπύργια οἰκοδομεῖν καθάπερ ἐν Ῥόδῳ κατεσκεύασται. **(60)** Τῶν δὲ ἐπάλξεων τὰς μὲν ὑποστάσεις δεῖ ποιεῖν τριῶν πλινθίων, ἵνα ὑπὲρ αὐτῶν βάλλειν δύνωνται τοῖς προβόλοις οἱ φύλακες τοὺς πλησιάζοντας τῷ προτειχίσματι· αἱ δ᾽ ἐργωδῶς ἀποκόπτονται. **(61)** Πρὸ δὲ τῶν τετραγώνων πύργων προοικοδομεῖν δεῖ τριγώνους ἄλλους συνεχεῖς καὶ στερεοὺς ἀπὸ ἰσοπλεύρου τριγώνου, ἵνα περὶ τὴν ἐκκειμένην γωνίαν στερεὰν καὶ ἰσχυρὰν οὖσαν οἱ λιθοβόλοι παράφοροι γινόμενοι μὴ καταβάλλωσι τοὺς πύργους.

(62) Τοῖς δὲ πύργοις τὰ μεταπύργια οὐ δεῖ συναγαγεῖν· ἀνίσων γὰρ ὄντων τῶν βαρῶν οὐχὶ αἱ αὐταὶ ἐνδέσεις τοῖς θεμελίοις καὶ ταῖς πλίνθοις γίνονται κατά τε τοὺς πύργους καὶ <τὰ> μεταπύργια. **(63)** Τούτων δὲ συμβαινόντων ῥήξεις ἐν τοῖς τείχεσιν ἔσονται· καὶ ἐὰν πέσῃ τι τῶν μεταπυργίων, ἐπισπάσεται τοὺς τοίχους τῶν βαρῶν.

(64) Ἐργάσασθαι δὲ δεῖ τοὺς λίθους τῶν ἡμικυλινδρικῶν πύργων τὴν ἔξωθεν περιφέρειαν καταμετρήσαντα καὶ πρὸς αὐτὴν ἐμβολεῖς ξυλίνους κατασκευασάμενον διαδοῦναι τοῖς λιθουργοῖς, ἵνα εὐεργῶς καὶ ταχὺ ἐργάζωνται; **(65)** καὶ ἔσονται οὕτως συνεχῶς οἰκοδομούμενοι μάλιστ᾽ ἰσχυροὶ διὰ τὸ τὴν οἰκοδομίαν αὐτῶν τοιαύτην γίνεσθαι καὶ διὰ <τὸ> τῶν πετροβόλων τὰς πληγὰς παραφόρους συμβαίνειν καὶ μὴ εἴκειν τοὺς λίθους μηθέν· ἔξωθεν γὰρ εὐρύτεροι ἢ ἔνδοθέν εἰσιν. **(66)** Δεῖ δὲ τοὺς γωνιαίους καὶ τοὺς ἔξωθεν τιθεμένους λίθους ὡς μεγίστους καὶ παχυτάτους καὶ ἀκροτόμους εἶναι.

(67) Τῶν δὲ βαρῶν καὶ τῶν πύργων πάντων κάτωθεν παρὰ τὰς γωνίας τοίχους ἁπτομένους ἄκρων τῶν γωνιῶν προσοικοδομεῖν, ἵνα ὑπόστασιν ἔχωσιν οἱ κινδυνεύοντες· **(68)** καὶ προτειχίσματα περὶ αὐτοὺς καὶ χάρακα κατασκευάζειν, ἵνα ἐὰν προτείχισμα πέσῃ καὶ ἐντὸς αὐτοῦ γένωνται οἱ πολέμιοι, μὴ ὑπορύττωσιν αὐτοὺς προστιθέντες τὰς δοκίδας.

(69) Ὀρυκτέαι δέ εἰσιν ἐν πάσαις ταῖς τειχοποιίαις οὐκ ἐλάττους τριῶν τάφρων, ὧν δεῖ τὴν μέν

that the towers project at one corner, and that the curtains are built just as has been provided for in Rhodes. **(60)** It is necessary to make the supports of the parapets (with a dimension) of three (?)small blocks, in order that the guards can throw missiles over them at those coming close to the outwork; and they are severed (only) with difficulty. **(61)** In front of the tetragonal towers it is necessary to build out other, triangular ones, continuous and solid in the shape of an equilateral triangle, in order that stone-projectors, being made to deviate round a protruding angle which is solid and strong, will not bring the towers down.

(62) One must not connect the curtains with the towers (in the 'doubled' system); for with the bastions being unequal the same fastenings, in the footings and in the blocks, do not occur in respect of both the towers and the curtains. **(63)** When these (connections) do occur, there will be rents in the walls; and if any part of the curtains should fall, it will involve the sides of the bastions.

(64) It is necessary to fashion the stones of semicylindrical towers after measuring the outside curvature (required) and preparing, on the basis of it, wooden templates to give to the stonemasons, in order that they may work efficiently and quickly; **(65)** and built thus in series (the towers) will be particularly strong because of having this sort of construction and because the blows of the rock-projectors are made to deviate and the stones will not give way at all; for they are broader on the outside than on the inside. **(66)** It is necessary that the stones at the corners and the ones being placed on the outside are as large and thick as possible and sharp-cut.

(67) At the foot of all bastions and towers, by the corners, (it is necessary) to build out spur-walls attached to the tips of the corners, in order that the combatants may have a support; **(68)** and to provide outworks round them and a palisade, in order that if an outwork should fall and the enemy come within it, they may not put forward their screens and undermine the (towers).

(69) No fewer than three trenches are to be dug in all fortification-systems: the first

πρώτην ἀπέχειν ἀπὸ τοῦ τείχους πλέθρον, τὴν
δὲ δευτέραν ἀπ᾽ αὐτῆς πήχεις μ᾽, τὴν δὲ τρίτην
ἴσον ἀπὸ τῆς δευτέρας. (**70**) Ἀνὰ μέσον δὲ τῶν δια-
στημάτων ἐπὶ εἴκοσι ὀκτὼ πήχεις τὸ πλάτος
σκόλοπας καταπῆξαι καὶ ὀρύγματα ποιῆσαι καὶ
παλίουρον φυτεῦσαι, ἵνα τῷ ταλαντιαίῳ πετροβόλῳ
θέσιν μὴ ἔχωσιν, ἐὰν τῆς πρώτης τάφρου κρατή-
[*85*] σωσιν οἱ πολέμιοι· (**71**) δώδεκα γὰρ ἐστι πηχῶν τοῦ
ταλαντιαίου πετροβόλου ἡ σύριγξ, ἡ δὲ σκυ-
τάλη δ᾽ πηχῶν, ὥστε παράστασιν οὐχ
ἕξει τοῖς περιάγουσι τὸν ὄνον. (**72**) Ποιητέον δ᾽ ἐστὶ
τὰς τάφρους ὡς βαθυτάτας καὶ μὴ ἔλαττον τὸ
εὖρος ἑβδομήκοντα πήχεων· (**73**) τοσούτων καὶ τοιού-
των τάφρων ὀρυχθεισῶν οὔτε χωσθήσεταί <τις> τα-
χέως, ὅ τε ταλαντιαῖος πετροβόλος, ὃς ἐστι σφο-
δρότατος, ἢ οὐκ ἀφίξεται πρὸς τὸ τεῖχος
ἢ ἔκλυτος ὢν ἀντιτυπτήσει, αἵ τε στοαὶ οὐ πλη-
σιάσουσι τῇ πόλει, ὅ τε κριός, ἐάν τινες αὐ-
τῶν χωσθῶσιν, οὐ δυνήσεται τύπτειν τοὺς πύρ-
γους. (**74**) Ὀρύττοντας δὲ δεῖ τὰς τάφρους τῆς μὲν
πρώτης τὴν ἀναβολὴν ποιεῖσθαι τοῦ χοῦ
πρὸ τοῦ τείχους, τῶν δὲ ἄλλων εἰς τὰ δια-
στήματα ἀνὰ μέσον, ἵνα ὅ τε χάραξ ἀσφα-
λῶς τίθηται καὶ ὕψος λαμβάνοντα τὰ δια-
στήματα ἀσφάλειαν παρέχηται τῷ προτειχίσ-
ματι καὶ τῷ τείχει· (**75**) θετέος δέ ἐστι πρὸ τῆς
δευτέρας καὶ τῆς τρίτης ἄνευ προτειχισμάτων
ὁ χάραξ, ἵνα ὑπόστασιν τοῖς ἐναντίοις μὴ ἔχῃ.
(**76**) Πρὸ δὲ τῆς ἐσχάτης τάφρου συναγαγόντας πα-
ρά τε τῶν πολιτῶν καὶ δημοσίᾳ κεράμια
ὀρθὰ καὶ κενὰ δεῖ κατορύττειν, σάξαντας τὰ στό-
ματα φύκει· ἄσηπτον γάρ ἐστι· μετὰ δὲ ταῦ-
τα γῆν ἄνωθεν ἐπιβάλλειν, ὥστε τοὺς μὲν ἀν-
θρώπους μηθὲν πάσχειν δεινὸν ἐπ᾽ αὐτῶν βα-
δίζοντας, τὰς δὲ προαγομένας χελώνας καὶ
μηχανήματα ἐπ᾽ αὐτῶν καταδύνειν. (**77**) Πολ-
λαχοῦ δὲ ὀρυκτέον καὶ τέλματα, περὶ ἃ πα-
λίουρον δεῖ φυτεύειν, ἵνα ὡς μάλιστα δυσχέ-
ρεια γίνηται. (**78**) Καταλείπειν δὲ τὰς τάφρους ὀ-
ρύσσοντας ὀρθῶς ἐχούσας ὁδοὺς ἁμαξηλάτους
ἱκανάς, ἵνα κομίζειν εἰς τὴν πόλιν ὅσα προ-
σῆκον ἐκ τῆς χώρας δυνώμεθα.

(**79**) <…> χρήσιμοι δέ
εἰσι καὶ οἱ τρίβολοι, οἷς ἀλοῶσι, καὶ αἱ ἀγκυ-

of them must be a plethron (30.8 m.) away from the wall, the second 40 cubits (18.48 m.) from this (first trench), the third an equal (distance) from the second. (**70**) In the middle of the (two intervening) spaces, over a breadth of twenty-eight cubits (12.936 m.), (it is necessary) to fix stakes and to create excavations and to plant a thorn-hedge, in order that the enemy may not have a position for the one-talent (26 kg.) rock-projector, if they gain control of [*85*] the first trench (they come to); (**71**) for the tube of the one-talent rock-projector is twelve cubits (5.544 m.) (long), the handle 4 cubits (1.848 m.), which will result in no standing-room for the men turning the winch round. (**72**) The trenches are to be made as deep as possible and not less than seventy cubits (32.34 m.) in width; (**73**) once trenches of this number and kind have been dug there will be no filling-in <of any> quickly, and the one-talent (26 kg.) rock-projector – which is very powerful – either will not reach the wall or will strike it with no force, and the stoas will not come close to the city, and the ram, (even) if some of these (trenches) are filled in, will not be able to strike the towers. (**74**) It is necessary for those digging the first of the trenches to create the excavation's mound in front of the wall, and (those of) the others in the (intervening) spaces, in the middle, in order that the palisade may be placed securely and that by taking on height the spaces may provide security for the outwork and for the wall; (**75**) but the palisade which is to be placed in front of the second and the third (trenches) should have no outworks, in order that there would be no support for the opponents.

(**76**) In front of the outermost trench it is necessary to collect pots both from the citizens and at public expense and to bury them upright and empty – having stuffed their mouths with seaweed, for it is impervious to rot; then to throw earth on top, so that people who walk over them suffer nothing terrible but the tortoises being brought forward and machines sink down onto them. (**77**) In many places ponds, too, are to be dug, round which it is necessary to plant a thorn-hedge, in order that as much difficulty as possible be created. (**78**) When the trenches are being dug (it is necessary) to leave enough roads straight across that wagons can use, in order that we may convey into the city whatever is requisite out of the countryside.

(**79**) <…> and also useful are *triboloi*, (of the kind) with which threshing is done, and hooked (?)poles and notched (?)cutters,

ρωτοὶ δοκίδες καὶ οἱ χηλωτοὶ κοπεῖς πρὸς τὸ
κωλύειν καὶ ἐκτραχηλίζειν τὰς προστιθεμένας κλί-
μακας. (**80**) Δεῖ δὲ καὶ μηχανήματα ὑπότροχα ὑπάρχειν,
μάλιστα μὲν β΄, εἰ δὲ μή γε ἕν, ἵνα ῥᾳδίως παρα-
γένηται οὗ ἂν αὐτῶν γίνηται χρεία <…>.

(**81**) Κατασκευαστέον
δὲ καὶ παρόδους καὶ διόδους ἀσφαλεῖς ἐπὶ τὰς παρα-
βοηθείας τοῦ χάρακος, ἵνα μὴ οἱ πολέμιοι ἐπὶ
τὰ χεῖλη στήσαντες τῆς τάφρου τοὺς πετροβόλους
ἐρύματι χρῶνται <αὐτῇ> καὶ τοῖς πολεμίοις μὴ ᾖ χρή-
σιμος, ἡμῖν δὲ ἡ ταφρεία. (**82**) Σπουδαστέον δ᾽ ἐστὶν ὡς μά-
λιστα περὶ τὰ προτειχίσματα καὶ τὰς τάφρους καὶ
τὰς χαρακώσεις· ὑπὸ γὰρ τῶν λιθοβόλων καὶ
στοῶν ῥᾳδίως ἁλίσκεται τὰ τείχη. (**83**) Περὶ οὖν ταῦτα
φιλοτιμητέον ἐστίν, ἵνα ὡς ἰσχυρότατα <ᾖ τὰ> προ-
τειχίσματα καὶ αἱ χαρακώσεις, καὶ αἱ τάφροι
[*86*] ὡς πλεῖσται καὶ βαθύταται γίνωνται· τού-
των γὰρ ἁρμοζομένων οὐθὲν ἂν πάθοι δεινὸν ἡ πόλις.

(**84**) Ὀρθῶς δ᾽ ἔχει τὰς τειχοποιίας ποιεῖσθαι
προορῶντα τοὺς τόπους· ἄλλη γὰρ ἄλλη ἁρ-
μόττει, οἷον ἡ μὲν μαιανδρώδης τῇ πεδινῇ· ἡ δὲ ἐκ
τῶν ἡμικυκλίων καὶ πριονωτή, ὅταν ὁ τόπος
ᾖ σκολιός, ὃν ἔσω δεῖ περιλαβεῖν· ἡ δὲ διπλῆ,
ὅταν κόλπους καὶ ἀναχωρήσεις ἔχῃ, τὸ πόλισμα
ὅπου δεῖ κτισθῆναι· ἡ δὲ λοξὰ τὰ μεσοπύρ-
για ἔχουσα τοῖς τριγώνοις εἴδεσιν· ἡ δὲ ἀρ-
χαία τοῖς περιφερέσι χωρίοις. (**85**) Εὐλαβητέον τ᾽ ἐστὶν
ἐν πάσαις ταῖς πυργοποιίαις, ἵνα κατὰ μη-
θὲν τὸ τεῖχος ἀμφίβολον οἰκοδομῆται.

(**86**) Δεῖ δὲ καὶ
τῶν ἀγαθῶν ἀνδρῶν τοὺς τάφους καὶ πολυάν-
δρια πύργους κατασκευάζειν, ἵνα ἥ τε πόλις ἀ-
σφαλεστέρα γίνηται καὶ οἱ μὲν δι᾽ ἀρετὴν <ἀρισεύσαντες>, οἱ
δ᾽ ὑπὲρ τῆς πατρίδος τελευτήσαντες ἐν αὐτῇ
τῇ πατρίδι καλῶς ὦσι τεθαμμένοι.

(**87**) Τούτων δὲ
ὧν δεδηλώκαμεν πασῶν τῶν πυργοποιιῶν ἐν
αὐτῷ σοι τῷ βιβλίῳ τὰ σχήματα γέγραπται,
σαφέστερον ἵνα καταμάθῃς.

with a view to thwarting and overturning the ladders that are being brought up. (**80**) It is also necessary to have wheeled machines – ideally 2; if not, at any rate one – in order that they can be available where there is a need of them <…>

(**81**) To be provided also are secure ways along and ways through, for bringing reinforcements to the palisade, in order that the enemy may not stand rock-projectors on the lips of the trench and use <it> as a stronghold – and that the entrenchment should not be useful to the enemy but to ourselves. (**82**) The utmost care is to be taken over the outworks and the trenches and the palisadings; for walls are easily taken by stone-projectors and stoas. (**83**) Pride is to be taken in these things, therefore, in order that the outworks and the palisadings are as strong as possible, and the trenches [*86*] are as numerous and as deep as possible; for with these things appropriately done the city would suffer nothing terrible.

(**84**) It is good practice to create fortification-systems by observing the terrain beforehand; for one fits here and another there. For instance: the meandering one (fits) level ground; the one (formed) out of semicircles and the serrated one (are best) when the terrain which it is necessary to enclose is oblique; the double one, when there are hollows and recessions where it is necessary to establish the settlement; the one which has slanting curtains for (salients in) triangular shapes, the old one for rounded sites. (**85**) Care is to be taken in all fortification-systems that the wall is at no point built attackable from both sides.

(**86**) It is also necessary to provide the tombs of brave men and multiple burial-places (in the form of) towers, in order both that the city may become more secure and also that those <who achieved distinction> in valour and those who died for their fatherland may end honourably buried in the fatherland itself.

(**87**) The shapes of all these fortification-systems that we have presented have been drawn for you in the book itself, in order that you may grasp them more clearly.

B

(**1**) Ὀρθῶς δὲ ἔχει δη-
μοσίᾳ καὶ κατὰ τὰς ἰδίας οἰκίας ἀποκεῖσθαι πολλὰ
τῶν ἀσήπτων, οἷον κάχρυ καὶ τὸν ἐν τοῖς δράγ-
μασι πυρὸν καὶ ἐρεβίνθους καὶ θέρμους καὶ
ἱππάκην καὶ ὀρόβους καὶ σήσαμον καὶ μήκωνας
πρὸς τὰς τῶν φαρμάκων συνθέσεις, ἔτι δὲ κέγ-
χρον· πρὸς δὲ τοὺς φοινικικοὺς ἄρτους· (**2**) καὶ παρὰ
τοῖς εὐπόροις τῶν πολιτῶν κρέα κρεμαστὰ <ἢ> συγ-
κείμενα ἐν οἰνηρᾷ τρυγίᾳ, ἄλλα δὲ ἡλισμένα·
πρός τε γὰρ τροφὴν καὶ ἰσχὺν οὐ μικρὰν συμ-
βαλεῖται καὶ αὐτάρκειαν παρέξεται πᾶσαν οὐδὲν
ἀρτύσεως οὐδ᾽ ἁλὸς προσδεόμενα· (**3**) καὶ ἀράκους
μάλιστα μὲν πεφωσμένους, εἰ δὲ μή, ὡς ἔχει,
ἄλλους <δ᾽> ἐν ἀμόργῳ πεφυραμένους· οὕτω γὰρ
ἄσηπτον γίνεται· (**4**) καὶ ἥπατα ἔξω τῶν ὑείων ἔχοντα
τὴν χολὴν ἡλισμένα καὶ ἐξηραμμένα ἐν σκιᾷ·
ἀπαθέστερα γὰρ οὕτω διαμένει. (**5**) Συνάγειν δὲ
ταῦτα δεῖ παρὰ τῶν μαγείρων καὶ τῶν ἰδιω-
τῶν ψηφίσματι περιβάλλοντας.

(**6**) Τὰς δὲ κριθὰς δεῖ
καὶ τοὺς πυροὺς <φυλάσσειν> ὡς βέλτιστα καθάραντας καὶ
σιροὺς ὡς βαθυτάτους ὑπαιθρίους ὀρύξαντας
καὶ τούτων τὸ ἔδαφος ἀλείψαντας ὅσον ἐπὶ
τέσσαρας δακτύλους τὸ βάθος πηλῷ διειργασμένῳ
καὶ ἠχυρωμένῳ καὶ κύκλῳ περιαλείψαντας
ἀμόργῳ· (**7**) ἔστω δὲ τὰ μὲν δύο μέρη χνοῦ,
τὸ δὲ ἓν ἄμμου εἰς τὸν πηλὸν ἐμβεβλη-
μένα. (**8**) Ἐν τούτοις καλῶς ἔχει θησαυρίζειν, ἂν
ὡς μάλιστα ξηρανθῶσιν. (**9**) Ἐμβληθέντος δὲ τοῦ
σίτου δεῖ ὄξους κεράμιον ὡς δριμυτάτου εἰς
τὸν μέσον ἄχρι τοῦ τραχήλου κατορύξαι· καὶ
περιβαλόντα ἄνωθεν <ἐν> κωνοειδεῖ σχήματι πλίνθους
[87] καταλεῖψαι πηλῷ· οὕτω γὰρ ἄσηπτος γίνεται.

(**10**) Τίθεται δὲ καὶ ἄλλον τρόπον ἐν ὑπερῴοις δια-
ληλειμμένοις ἐν ἀμόργῳ τοὺς τοίχους καὶ τὸ ἔ-
δαφος, καὶ τὰς θυρίδας ἔχουσι καὶ διεκπνοὰς
πλείους ἐστραμμένας πρὸς βορρᾶν καὶ πεφραγ-
μένας δικτύοις, ἵνα μήθ᾽ ὑπὸ τῶν ὀρνίθων
κατεσθίηται μήτε θηρία ἐγγίγνηται· ὁ πυρὸς <δ᾽ οὐ> σήπεται
τεθέντος ὡσαύτως ὄξους.

B

(**1**) It is good practice to store away, in public keeping and in private houses, many of the things that are impervious to rot, such as (?) parched barley and wheat (still) in its sheaves and chickpeas and lupins and *hippake* and bitter-vetches and sesame, and poppies for the concocting of potions, and millet besides; plus date loaves; (**2**) and among those citizens who are affluent (there should be) meats hung (to dry) <or> laid down in wine-lees, and others salted; for with a view to both nourishment and great strength they will also contribute total self-sufficiency, requiring no seasoning or salt; (**3**) and (store) *arakoi*, ideally toasted, otherwise in their natural state, and others mashed in olive-pressing fluid; that is how (something) impervious to rot comes about; (**4**) and (store) livers – except for pigs' – with the gall(-bladder), salted and dried in the shade; for thus they remain more unaffected. (**5**) It is necessary to collect these (livers) from butchers and private individuals by including them in a decree (to that effect).

(**6**) Barley and wheat it is necessary <to protect> by cleaning (it) as well as possible and digging open-air pits as deep as possible; smear the bottom of these, to a depth of four dactyls (7.7 cm.), with a well-worked mix of mud and chaff, and smear it all around with olive-pressing fluid; (**7**) and let there be two parts of powder and one of sand put into the mud. (**8**) In these (pits) it is a fine way of storing, for maximum dryness. (**9**) Once the grain has been put in, it is necessary to bury in the middle (of each pit), up to its neck, a pot of the most acrid vinegar possible; then to place bricks around it at the top, <in> a cone-like shape, and [87] smear them with mud; for thus (the grain) becomes impervious to rot.

(**10**) (Grain) is also deposited another way, in elevated (granaries) which have been coated in olive-pressing fluid on their sides and bottom; they also have windows and numerous ventilation-holes facing north and shielded with nets, in order that (the grain) is not devoured by the birds and that animals do not enter; <and> the wheat does <not> rot when, similarly, vinegar has been introduced.

(11) Ἐὰν δὲ ξύλων σπανίζωμεν, δεῖ τοὺς σιτοβολῶνας οἰκοδομεῖν οὕτως· ὅταν ὑποβαλώμεθα τοὺς θεμελίους τοῦ οἰκοδομουμένου οἴκου, λαβεῖν τὸ ἥμισυ τοῦ πλάτους καὶ τοσούτου ὕψους ἡμικύκλιον ποιῆσαι· **(12)** καὶ πρὸς τοῦτο δεῖ <διὰ> τριῶν πηχῶν οἰκοδομεῖν ἐφ' ἑκατέρου τοῦ τοίχου ἀψῖδας πλινθίνας· ἔστω δὲ πλάτη αὐτῶν <...> δύο πλίνθων ἐπιτεθεισῶν ἐπὶ τῶν θεμελίων τὰς ἀψῖδας ἐξῆχθαι δεῖ ὅσον πῆχυν τῷ μήκει· <...> τῷ δὲ πλάτει δίπηχυ ποιητέον. **(13)** Τοῦτο δὲ ἔστω ξεστῶν λίθων ἢ συγκρουστῶν ὡς μεγίστων, ἵνα δύνηται τὰ βάρη φέρειν. **(14)** Ὅταν δὲ συναχθῶσιν αἱ ἀψῖδες, ἐπὶ τῶν θεμελίων ὀρθοὺς οἰκοδομῆσαι τοίχους· **(15)** τὸ δ' ἀνὰ μέσον διάστημα τῶν τοίχων καὶ ἀψίδων πλίνθοις ἀποπληρῶσαι, ὥστε τετράγωνον γενέσθαι τὸ οἰκοδόμημα ἴσον τὸ ὕψος ταῖς ἀψῖσιν ἔχον. **(16)** Εἶτα εἰς τὰ ἀνὰ μέσον τῶν ἀψίδων διαστήματα στρωτῆρας ἐπιβαλεῖν τοὺς ἰσχυροτάτους καὶ ἄνωθεν κάλαμον καὶ κατα-
λεῖψαι ὡς βέλτιστα· **(17)** καὶ ἐπὶ τούτοις ἐάν τε βούλῃ σιτοβολῶνα οἰκοδομῆσαι, τὴν ἄνω ὀροφὴν δοκοὺς διαθεὶς καὶ στρωτῆρας ἐπιβαλὼν κεράμωσον καὶ κατάλειψον ὡς βέλτιστα· **(18)** ἐὰν δὲ μὴ οἰκοδομῇς, συνεχῆ τὴν οἰκοδομίαν ὥσπερ καμάρας ποιεῖν καὶ οὐθὲν στρωτήρων προσδεήσεται.

(19) Ἵνα δέ σοι εὔρυθμα γίνηται τὰ οἰκοδομήματα ἔχοντα σύμμετρον τὸ ὕψος τῷ μεγέθει, τοὺς θεμελίους ὑποβαλόμενος ὁπηλίκους ἂν βουληθῇς, [τούτοις ἴσον] λάμβανε τὸ ὕψος τῶν ἀψίδων ἀπὸ τῶν θεμελίων ὅσον εἰρήκαμεν.

(20) <...> Ἐὰν δὲ προέλῃ μήτε μονόλιθον εἶναι τὸ ὑπέρθυρον μήτε ξύλινον, μὴ ἐμπρησθῇ, ποιήσας τὴν εἴσοδον ὁπηλίκην βούλει ἐξοικοδόμησον πλίνθοις· **(21)** εἶτ' ἄνωθεν τιθεὶς ξεστοὺς λίθους ἔγκλισιν ἔχοντας τοὺς μὲν εἰς ἀριστερὰ τοὺς δὲ εἰς δεξιά, ἔπειτα ἐκ τοῦ μέσου κατάκλεισον ἄνωθεν μὲν λίθῳ εὐρεῖ, κάτωθεν δὲ στενῷ ἐναρμόσας ὥσπερ σφῆνα· **(22)** τοῦτο δὲ ποιήσας ἔξελε τὰς εἰς τὴν διόδον ἐμβληθείσας πλίνθους· μενεῖ γὰρ ἀσφαλῶς. **(23)** Χρήσιμον δὲ τοῦτο καὶ ἐν ταῖς πυργοποιίαις, ἀντὶ τῶν ψαλίδων ἐάν τις βούληται οὕτως κατασκευάζειν τὰς πυλίδας. **(24)** Τοὺς μὲν οὖν σιτοβολῶνας οὕτω κατασκευαστέον ἐστίν.

(11) Should we be short of timbers, the granaries must be built as follows. When we are laying the foundations of the building being built, take half of the breadth and make a semicircle of the same height; **(12)** and for this it is necessary to build, every three cubits (1.386 m.) on each side, arches of blocks; let the breadth of them be <...>; when two blocks have been put in on the foundations it is necessary that the arches be brought out to a length of a cubit (0.462 m.); <...> is to be made two-cubit (0.924 m.) in breadth. **(13)** Let this be (built) of stones hewn or rough, as large as possible, in order that the weights can be sustained. **(14)** When the arches have been brought together, build upright sides on the foundations; **(15)** and fill up the interval between the sides and arches with bricks, so as to make the edifice tetragonal, its height the equal to the arches. **(16)** Then into the intervals between the arches (it is necessary) to insert rafters, the strongest (available), and reed at the top, and to plaster as well as possible; **(17)** and if you wish to build a(nother) granary on these, when you have placed joists and inserted (more) rafters (as) the upper ceiling, tile, and plaster as well as possible; **(18)** but if you are not going to build (one), make the building(-process) continuous just like barrel-vaults and there will no need of rafters.

(19) In order that your buildings be harmonious (and) with proportionality between height and size, when you have laid down the foundations however big you wish, take the height of the arches from the foundations to the extent we have stated.

(20) <...> If you prefer the lintel to be neither monolithic nor, in case of fire, wooden, make the entrance as big as you wish and build (it) up with bricks; **(21)** next, when you have placed on top hewn stones which have an incline, some to the left and others to the right, then close off (the structure) at the top, in the middle, with a broad stone, fitting (it) in at the bottom in a narrow (space) just like a wedge; **(22)** and when you have made this, remove the bricks which were inserted into the doorway; for it will remain safely. **(23)** This (procedure is) useful in fortification-systems too, if instead of vaults anyone wants to build posterns thus. **(24)** So that is how granaries are to be built.

(**25**) Τυγχάνει δὲ τοῦ σίτου ἀπαθέστερος ὁ σπα-
[88] ρεὶς καλῶς εἰς κατειργασμένην γῆν καὶ θε-
ρισθεὶς ξηρὸς καὶ μείνας ἐν τοῖς δράγμα-
σιν ὡς πλεῖστον χρόνον. (**26**) Γίνεται δὲ καὶ ἄλλως
ἄσηπτος, ἐὰν ἐκ τῆς καλάμης ὠλένας ποιή-
σας κύκλῳ περὶ τοὺς σιροὺς περιτείνῃς αὐτούς,
εἶτ᾽ ἀργιλώδει πηλῷ διαπάττων ἐμβάλῃς
τὸν σῖτον <ἢ> ἥπατα ἐλάφου ξηρὰ κατατεμών
μικρὰ ἐμβάλῃς. (**27**) Μάλιστα δὲ ἄσηπτον διαφυ-
λάττει τὸν πυρὸν καὶ κριθὴν καὶ τὰ ὄσπρια, ἐὰν
συγκόψας τὸν τῆς τήλεως καρπὸν διὰ πετρῶν
εἰς τοὺς σιροὺς ἀποτιθῇ τοὺς εἰρημένους
καρπούς, ἢ τὴν κόνυζαν ἢ τὴν ὀρίγανον ὡς ἔχει
διαμίσγων ἐν τοῖς σιροῖς θησαυρίζῃς τὰ
ὄσπρια· (**28**) κἂν οὖρῳ ἔξωθεν ἐπιρρύτους ποιήσῃς
τοὺς σιτοβολῶνας, διαφυλάττουσιν ἀφθάρτους
τοὺς καρπούς.
(**29**) Δεῖ δὲ τὰ τοιαῦτα οἰκοδομήματα
καὶ χώνας ἔχειν ἐν μέσαις ταῖς ὀροφαῖς, ἵνα,
ἐὰν βουλώμεθα, βάλληται καὶ κατακομίζη-
ται ῥᾳδίως καταρρέων ὁ σῖτος εἰς τὸ κάτω
οἴκημα.

(**30**) Τίθεσθαι δὲ προσήκει μὴ ἔλαττον
εἰς ἐνιαυτὸν τὸν σῖτον τὴν πόλιν· ἀγοράζειν
δὲ δεῖ ὅταν εὐωνότατος ᾖ καὶ διελθόντος τοῦ
χρόνου τὸν μὲν παλαιὸν ἀναλίσκειν, νέον δὲ
ἄλλον τίθεσθαι πρὸς τὰς γινομένας πολιορ-
κίας καὶ τὰς συμβαινούσας σιτοδείας.

(**31**) Χρή-
σιμον δέ ἐστι καὶ σκίλλας καὶ βολβοὺς ἐν ταῖς
οἰκίαις ἀποτίθεσθαι καὶ φυτεύειν ἐν τῇ πόλει
καὶ κύκλῳ περὶ τὸ τεῖχος, ἵνα κατασκευαζο-
μένου τοῦ Ἐπιμενιδείου φαρμάκου μηθὲν ἡμῶν
πάσχωσιν οἱ πολῖται κατὰ τὰς συμβαινούσας σι-
τοδείας. (**32**) Συντίθεται δὲ τὸ λελεγμένον φάρ-
μακον κατὰ τρόπον ἀφεψηθείσας <σκίλλης
καὶ πλυθείσης ὕδατι καὶ ξηρανθείσης> κατακο-
πείσης <τε> ὡς λεπτότατα καὶ μετὰ ταῦτα παρα-
μιχθέντος εἰς αὐτὴν σησάμου μὲν τοῦ
πέμπτου μέρους, μήκωνος ὡς πεντεκαιδεκάτου·
καὶ πάντων τούτων λεανθέντων ἐν τῷ αὐτῷ,
ὡς βελτίστῳ μέλιτι φυράσαντα διελεῖν ὅσον
εἰς ἐλαίας τὰς μεγίστας γινομένας· (**33**) καὶ τούτων

(**25**) There are circumstances in which grain will be more unaffected when it has been sown [*88*] rightly into well-worked earth and harvested dry and remains in the sheaves for as long a time as possible. (**26**) And otherwise, too, it is impervious to rot if you make mats out of straw and spread them in a circle round the pits; then put in the grain, sprinkling (it) with clayey mud <or> cutting up dried deer's livers and putting in small pieces. (**27**) An especially good way of keeping wheat and barley and pulses impervious to rot (is) if you grind together, between stones, the fruit of the fenugreek and put away the aforementioned crops into the pits; alternatively you could store the pulses by mixing through fleabane or oregano in its natural state in the pits; (**28**) and if you create the granaries flowing with urine from the outside, they will keep the crops decay-free.

(**29**) It is necessary that buildings of this kind also have funnels in the middles of their ceilings, in order that, should we wish, the grain can be let fall and easily conveyed into the chamber below by flowing down.

(**30**) It is appropriate for the city to deposit grain (enough) for no less than a year; it is necessary to buy it when it is at the best price and, when the time has passed, to use up the old and to deposit new, with a view to the sieges that occur and the food-shortages that take place.

(**31**) It is also useful to put away squills and *bolboi* in the houses and to plant (them) in the city and round the circuit of the wall, in order that, when the (?)Epimenidean potion has been prepared, our citizens may suffer nothing in the food-shortages that take place. (**32**) The potion referred to is duly put together when one has boiled down <squill and rinsed it in water and both dried it and> chopped it up as fine as possible and then mixed into it a fifth part of sesame and around a fifteenth of poppy; and when all these (ingredients) have been pounded in the same (vessel), mix with best-quality honey and divide into (balls) the size of the largest olives; (**33**) and anyone taking one of these

ἓν μὲν περὶ δευτέραν ὥραν, ἓν δὲ περὶ δε-
κάτην ἀναλίσκων τις οὐθὲν ἀπὸ λιμοῦ πάθοι ἂν δεινόν.

(34) Ἔστι δὲ καὶ ἄλλο παραπλήσιόν τι τού-
τῳ φάρμακον, ὃ δεῖ συντιθέναι τοῦτον τὸν τρό-
πον· **(35)** λαβεῖν σησάμου Ἀττικὸν ἡμίεκτον καὶ μέ-
λιτος ἡμιχοῦν καὶ ἐλαίου κοτύλην καὶ χοίνικα
ἀμυγδάλων γλυκέων λελεπισμένων, φρύ-
ξαντα τὸν σήσαμον καὶ τὰ ἀμύγδαλα κατα-
λέσαι καὶ σεῖσαι· **(36)** εἶτα τὰς σκίλλας περιλεπίσαν-
τα καὶ τὰς ῥίζας καὶ τὰ πέταλα ἀποτεμόντα
καὶ διέλοντα μικρὰ εἰς θυίαν ἐμβαλόντα τρῖ-
ψαι ὡς λειότατα· **(37)** μετὰ δὲ ταῦτα τῶν τετριμ-
μένων σκιλλῶν <ἴσον> τῷ μέλιτι τρῖψαι ὁμαλῶς
[*89*] ἅμα τῷ ἐλαίῳ καὶ ἐγχέαντας εἰς χύτραν ἑψεῖν
ἐπιθέντας ἐπ᾽ ἀνθρακιᾶς· **(38)** ὅταν δὲ ἄρξηται ζεῖν
παρεμβαλόντα τοῦ σησάμου καὶ τῶν ἀμυγδάλων
ἅμα ξύλῳ διακινεῖν μέχρις ἂν ἅπαντα ἐμ-
βληθῇ· **(39)** ὅταν δὲ γένηται στερεὸν ἰσχυρῶς, ἀφελόντα
διελεῖν ὅσον εἰς ψωμοὺς μικρούς, καὶ ἕνα πρωί,
ἕνα δείλης ἀναλίσκων ἄν τις ἱκανὴν ἔχοι τρο-
φήν. **(40)** Τυγχάνει δὲ καὶ πρὸς τὰς στρατιὰς ἱκανὸν τοῦτο <τὸ>
φάρμακον· ἡδὺ γάρ ἐστι καὶ πλήσμιον καὶ δίψαν
οὐκ ἐμποιεῖ.

(41) Συντίθεται δὲ βρῶμα καὶ ἐκ τοῦ τῆς μο-
λόχης καὶ ἐκ τοῦ σκίλλης καρποῦ, ἴσων μιχθέντων
τούτων καὶ ἐν ὅλμῳ κοπέντων καὶ μετὰ ταῦτα καὶ μέ-
λιτι ἐφθῷ φυραθέντων, καὶ τῶν ἴσων ψωμῶν τοῖς
εἰρημένοις διδομένων τροφὴν ἱκανὴν παρέχεται
τοῖς πολιορκουμένοις.

(42) Ἐσθίεται δὲ καὶ ἡ σκίλλα καὶ ἀ-
θεψηθεῖσα καὶ ὁμοίως τῷ βολβῷ σκευασθεῖσα καὶ
ἐγκρυφθεῖσα καὶ ὀπτηθεῖσα καλῶς, εἶτα <…> περιλη-
φθεῖσα· καὶ σὺν τῷ ὀροβίνῳ ἀλεύρῳ ἐν τῷ αὐτῷ
κοπεῖσα πίνεται ἐν οἴνῳ κεκραμένῳ ὅσον τρισὶ
κοτύλαις καὶ μέλιτι, καὶ ἐν αὐτῷ τῷ οἴνῳ διατηχ-
θεῖσα οὕτως, ὥστε γίνεσθαι τὸ πάχος ὡς κυκεῶνα·
(43) τοῦτον δὲ τὸν τρόπον προσφερομένη τροφὴν ἱκανὴν
παρέχει καὶ κάθαρσιν διὰ τῶν οὔρων οὐκ ἄτοπον
ἀπεργάζεται. **(44)** Γίνεται δὲ καὶ ἐξ αὐτῆς ἄρτος τρὶς ἀ-
φεψηθείσης <καὶ τριβείσης> λείας καὶ μιχθείσης τρίτῳ μέρει σται-
τὸς τροφὴν ἰσχυρὰν παρέχεται τοῦτον τὸν τρόπον θεραπευ-
θεῖσα.

around the second hour (of daylight) and one around the tenth should suffer nothing terrible from hunger.

(34) There is another potion somewhat similar to this, which it is necessary to put together in the following way. **(35)** Take an Attic half-hekteus (4.377 l.) of sesame and a half-chous (1.642 l.) of honey and a kotyle (0.274 l.) of oil and a choinix (1.094 l.) of peeled sweet almonds; toast the sesame and grind down and sieve the almonds; **(36)** then thoroughly peel the squills and cut off the roots and the leaves and, having portioned them small, put them into a mixing-bowl and crush them as fine as possible; **(37)** after that, crush the crushed squills smoothly with <an equal amount of> the honey [*89*] together with the oil, pour into a pot, place on the coals, and boil; **(38)** when it begins to bubble, add in the sesame and the almonds and stir with a piece of wood until everything combines; **(39)** when it has become exceedingly solid, remove it from (the fire) and divide it into small morsels, and anyone taking one in the morning and one in the evening should get adequate nourishment. **(40)** This potion can be adequate for campaigns too; for it is sweet and filling and does not produce thirst.

(41) A foodstuff is also put together out of the (fruit) of the mallow and out of the fruit of the squill: these are mixed in equal quantities and chopped in a mortar and then made into a paste with cooked honey; and when given in morsels of the size stated they provide adequate nourishment for those under siege.

(42) Also eaten is a squill which has been boiled down and prepared in the same way as a *bolbos* and hidden (under the ashes) and well baked, then wrapped up <…> ; also, chopped with bitter-vetch meal in the same (mortar), it is drunk in mixed wine – three kotylai (0.822 l.) – and honey, after it has been softened in the wine itself in such a way as to produce a posset-like thickness; **(43)** deployed in this manner it provides adequate nourishment and brings about a natural evacuation through urinating. **(44)** Bread is also made out of it: boiled down three times <and crushed> smooth and mixed with a third part of (?) emmer-dough, it provides strong nourishment when prepared in this manner.

(**45**) Ὡσαύτως δὲ καὶ τὰ σῦκα μετὰ τῶν γιγάρτων καὶ τῆς σταφίδος κοπέντα καὶ εἰς παλαθίδια διαμερισθέντα καὶ μαράθῳ διαχρισθέντα χρήσιμα πρὸς πολιορκίαν ὡς ἐνδέχεται μάλιστα γίνεται.

(**46**) Παρέχεται δὲ τροφὴν οὐθένος χείρω καὶ τὰ κρέα σφοδρῶς ἑψηθέντα καὶ διατακέντα καὶ βουτύρῳ καὶ μέλιτι μιχθέντα, καὶ ἐγχυθεὶς πᾶς ὁ ἐξ αὐτῶν γινόμενος ζωμὸς εἰς ἀγγεῖα καθαρά.

(**47**) Χρήσιμος δ᾽ ἐστὶ καὶ αἰγίλωψ ἑψηθεὶς ἐπὶ τέφρας μαλακῆς ἐν χύτρᾳ καινῇ ἐλαίῳ χρισθείσῃ· τροφήν τε γὰρ παρέχει καὶ δυσεντερίαν ἰᾶται.

(**48**) Συμφέρει δὲ καὶ κηπία ἐν ταῖς ἰδίαις οἰκίαις καὶ ἐν ταῖς ἀκροπόλεσιν καὶ ἔν τε τοῖς <ἄλσεσι καὶ> τεμένεσι τῶν θεῶν κατασκευάζειν ὑγείας ἕνεκεν καὶ ἐάν τις συμβαίνῃ πολιορκία· φυτευθεισῶν γὰρ συκεῶν καὶ φοινίκων, ἐὰν ἡ πόλις φέρῃ, καὶ σπαρείσης τῆς Ἰνδικῆς καὶ Ἑλληνικῆς κολοκύνθης καὶ ἄρων καὶ κράμβης καὶ θρίδακος καὶ τῶν ἄλλων λαχάνων οὐ μικρὰν παρέχεται ἐπικουρίαν.

(**49**) Δεῖ δὲ παρασκευάζεσθαι πρὸς τὰς πολιορκίας ὅπλα καὶ σίδηρον καὶ χαλκὸν καὶ πλίνθους καὶ λίθους χρησίμους πρὸς τὴν οἰκοδομίαν καὶ βέλη καὶ πετροβόλους καὶ ὀξυβελεῖς καταπάλτας καὶ μηχανοποιὸν καὶ ἄνδρας, οἳ χρήσιμοι τοῖς ὀργάνοις ἔσονται, καὶ κοφίνους [*90*] καὶ δικέλλας καὶ ἄμας καὶ ἀμάξας καὶ ἀξίνας καὶ σκαφεῖα. (**50**) Δεδοκιμάσθω δὲ ταῦτα πάντα κατ᾽ εἰρήνην ἐν ταῖς <οὐ> χρείαις, ἵνα μὴ κατὰ πόλεμον ἐν ταῖς συμβαινούσαις χρείαις συντριβόμενα ἀχρεῖα γένηται. (**51**) Πρὸς δὲ τούτοις φορμοὺς δεῖ ὑπάρχειν ἐν τῇ πόλει ὡς ἰσχυροτάτους καὶ πλείστους πρὸς τὸ ἐάν τι πέσῃ τοῦ τείχους τοὺς κινδυνεύοντας ἐμπιπλάντας αὐτοὺς ταχὺ παρασκευάζειν ἀσφάλειαν αὐτοῖς. (**52**) χωρὶς δὲ τούτων βύρσας καὶ πίσσαν καὶ μόλιβον καὶ θεῖον καὶ σχοινία παχέα καὶ λεπτὰ καὶ χάρακα καὶ φῦκος καὶ στυππίον καὶ οἶνον καὶ ἔλαιον καὶ ὄξος καὶ σπειράματα καὶ ξυλὰ καύσιμα [ὡς πλεῖστα] καὶ ναυ-

(**45**) Likewise too, figs chopped with pomace and (?)raisin and divided into little cakes and coated all over with (oil of?) fennel (are) useful for a siege, as far as is possible.

(**46**) Providing nourishment also, just as good, are meats which have been throughly boiled and softened and mixed with butter and honey, and any broth which comes out of them, poured into clean jars.

(**47**) Useful too is goat-grass, boiled over a gentle heat in a new pot coated with oil; for it provides nourishment and also cures dysentery.

(**48**) It is also advantageous to establish gardens in private houses and in citadels and also in the <groves and> precincts of the gods, for health's sake and if any siege occurs; for when figs and – if the city can produce them – dates have been planted, and the Indian and Greek gourd has been sown, and arums and cabbage and lettuce and other vegetables, this provides considerable support.

(**49**) With a view to sieges it is necessary to provide arms and iron and bronze and bricks and stones useful for building and projectiles and rock-projectors and bolt-firer catapults and an engineer and men who will be of service to the engines, and baskets [*90*] and mattocks and shovels and wagons and axes and (other) digging-implements. (**50**) Let all these things have been tested in peacetime in circumstances where they are <not> needed, in order that in wartime in situations of need they are not (found to be) worn out and useless. (**51**) In addition it is necessary to have available in the city baskets as sturdy and as numerous as possible; the aim of this is that, if any part of the wall should fall, the combatants can fill them and swiftly provide security for themselves; (**52**) besides these, hides and pitch and lead and sulphur and ropes thick and thin and stakes and seaweed and oakum and wine and oil and vinegar and (?)balls of twine and timbers for burning and (ones) for

πηγήσιμα ὡς πλεῖστα στρογγύλα καὶ τετράγωνα καὶ κώπας καὶ φοινικίνας σανίδας καὶ δᾷδας· (**53**) καὶ τὸ Ἀραβικὸν φάρμακον καὶ κογχύλιον τὸ ἐν τῇ λίμνῃ γιγνόμενον, ἣ ἀπέχει ἀπὸ Ἄκης πεντήκοντα σταδίους, καὶ ἰξόν, καὶ σαλαμάνδρας καὶ ἰὸν ἐχέων καὶ ἀσπίδων καὶ ναπτάλιον <ὃ> ἐν Βαβυλῶνι γίνεται καὶ ἰχθυηρὸν ἔλαιον πρὸς τὸ φθείρειν πολεμίων ἐπιπορευομένων τὰ ὕδατα, κἂν προελώμεθα κατὰ τοὺς γινομένους κινδύνους [πρὸς] τὰ μηχανήματα ἐμπιπράναι καὶ ἀλείφειν τὰ βέλη, ἵνα φόβον καὶ φθορὰν ταχεῖαν παρασκευάζῃ τοῖς τιτρωσκομένοις καὶ προσβάλλουσι πρὸς τὸ τεῖχος.

(**54**) Ἐὰν δὲ σαπρὰ γένηται τὰ ὕδατα, κρίθινον ἐμβάλλειν δεῖ θερμὸν <ἢ> εἰς τοὺς δύο χοέας ὄξους βελτίστου ὅσον κύαθον ζέσαντος ἐγχέαι καὶ μετ᾽ οὐ πολὺν χρόνον χρήσιμα γίνεται.

(**55**) Δεῖ δὲ καὶ τρυπητῆρα χαλκοῦν ἢ κεραμεοῦν κατασκευάσαι μὴ ἔλασσον ἢ τέσσαρας χωροῦντα μετρητάς, ἐν ᾧ <παρασκευάσαντί τε φελλὸν καὶ ἐμπλήξαντι βακτηρίαν, ἣ τριδάκτυλα ἴσα μέρη διαιρεῖται, καὶ> διαγράψαντι ἐν ταῖς μοίραις ἔσται γεγραμμένα τάδε· νῆες σῖτος ξύλα ὅπλα στρατιῶται καὶ ἄλλο ἐάν τι θέλῃς γράψαι τῶν κατὰ πολιορκίαν ἢ κατ᾽ ἄ<λλην τινα χρείαν> παρασκευαζομένων καὶ ἐκλειπόντων· (**56**) τούτων δὲ γεγραμμένων κἀκ τετρυπημένου τοῦ τρυπητῆρος ὕδατος ἐκχυθέντος σημαίνειν τῆς νυκτὸς κατὰ τὰς πυρσείας εἰς ὃ ἂν προαιρῇ στρατόπεδον ἢ πόλιν ἢ φυλακτήριον, ὥστε ἐκ διαδοχῆς ἐφικνεῖσθαι ὅπερ οἱ πυρσοὶ δυνατοί εἰσιν σημαίνειν, τίνος δέονται οἱ πολιορκούμενοι· (**57**) δεῖ δὲ ἐν τοῖς προειρημένοις τόποις ὁμοίους καὶ ἴσα ἔχοντας τρυπήματα [καὶ] ἄλλους τρυπητῆρας εἶναι τὰς αὐτὰς ἐπιγραφὰς ἔχοντας τῶν ὀνομάτων ἐν ταῖς αὐταῖς μοίραις, ἵνα αἰσθάνῃ, τίνα χρείαν ἔχουσιν οἱ πολιορκούμενοι συνθέματος αὐτοῖς ὄντος.

ship-building, (the latter) both round and square, as many as possible, and oars and date-palm planks and firebrands; (**53**) also the Arabian potion and a small mollusc, the one found in the lake which is fifty stades (9.24 km.) distant from (?)Ake, and mistletoe and salamanders and poison of vipers and of asps and naphtha, which is found in Babylon, and fish oil. (All these are needed) with a view to fouling the waters of enemies as they approach, and if, during the combats which occur, we choose to burn the(ir) machines and to smear (our own) projectiles, in order that they may cause fear and a quick death to men who are wounded and attacking the wall.

(**54**) If the waters become foul, it is necessary to put in hot barley(?-meal) <or> pour into every two choes (6.568 l.) one kyathos (0.0456 l.) of best vinegar, boiled, and not long afterwards they become usable.

(**55**) It is necessary also to prepare a perforated vessel, of bronze or pot, with a capacity no less than four metretai (157.56 l.), in which <for (someone who) has prepared a cork and fixed in a rod, divided into equal three-dactyl (5.77 cm.) parts, and> has drawn lines across, there will be the following captions in the parts: SHIPS GRAIN TIMBERS ARMS TROOPS and any of the other items you might want to write which are being prepared for a siege or a<nother emergency> and are lacking. (**56**) When these things have been done and water has been poured out of a perforation of the perforated vessel (it is necessary) to signal at night by means of beacons to whatever camp or city or guardpost one prefers, so as to arrive in succession (and) show what the beacons are able (to indicate): what those under siege are in need of. (**57**) And it is necessary, in the places stated, that there be other perforated vessels, similar and with the equivalent perforations; they have the same words written on the same sections, in order that you can tell what the men under siege are short of – as there is an agreed way of doing so.

C

(**1**) Τούτων δὲ παρεσκευασμένων πρὸ τῆς μελλούσης γενέσθαι προσβολῆς ἐφιστάναι δεῖ τὰ βέλη πάντα κατὰ τοὺς προσήκοντας ἑκάστῳ τόπους.

(**2**) <…> καὶ φείδεσθαι τῶν στρατιωτῶν καὶ τῶν πολιτῶν ὡς μάλιστα κατὰ τοὺς γινομένους κινδύνους καὶ μὴ ἐπιτρέπειν αὐτοῖς ἐμπηδῶσιν εἰ- *[91]* κῇ τραυματίζεσθαι, ἵνα ὅταν ᾖ χρεία ἔχῃς τοὺς κινδυνεύοντας ἐν τοῖς καθήκουσι καιροῖς.

(**3**) <…>. Μετὰ δὲ ταῦτα <πρὸς> τοὺς [μὲν] πετροβόλους ὀρθῶς ἔχει τὰς ἐκ τῶν φοινίκων σανίδας συνδήσαντας κατακρεμάσαι πρὸ τοῦ τείχους (ἰσχυραὶ γάρ εἰσι καὶ δυσέμπρηστοι), ἔπειτα μαλάγματα πρὸ αὐτῶν <, ἢ> ἀλλήλαις ἐπιβάλλονται, ἵνα μὴ αἱ συναρτήσεις αὐτῶν διακόπτωνται ὑπὸ τῶν βελῶν· (**4**) ἢ ἐκ τῶν σχοινίων πλέξαντας δίκτυα καὶ φύκους ἐμπλήσαντας κατασπᾶν. (**5**) Ἄνωθεν δ᾽ ἐκ τῶν ἐκκειμένων ξύλων αἱ ὁρμιστηρίαι δέδενται τῶν σανίδων καὶ τῶν μαλαγμάτων· δέρρεις δὲ δεῖ πρὸ αὐτῶν καταπετάσαι, ἵνα μὴ ὑπὸ τῶν βελῶν οἱ δεσμοὶ ἀποκόπτωνται. (**6**) Ἀνθιστάναι δὲ χρήσιμον πρὸς ἕκαστον αὐτῶν δύο δεκαμναίους λιθοβόλους, οὓς δεῖ μεταφέρειν οὗ ἄν καὶ οἱ πολέμιοι κινῶσί τινα τῶν πετροβόλων, ἵνα ἂν δύνῃ ἀνταφεὶς συντρίψῃς πατάξας τὸ ὄργανον.

(**7**) Πρὸς δὲ τὰς μεταλλεύσεις ὀρυκτέον ἐστὶν ἀνὰ μέσον τοῦ τείχους καὶ προτειχίσματος ἱκανὴν τάφρον ἰσηλίκην κατὰ βάθος τῶν θεμελίων τῷ κατὰ γῆς, ἵνα φανεροὶ γινόμενοι οἱ ὑπορύττοντες ῥᾳδίως διαφθαρῶσι καὶ μηκέτι τῷ τείχει πλησιάζωσιν.

(**8**) Πρὸς δὲ τὰς στοὰς [καὶ τὰ μηχανήματα] <εἰς> σωλῆνα ἀπό του ἔνδοθεν μηχανήματος ἢ πύργου ἐκταθέντα ἐμβάλλειν ἔσω τριταλάντους λίθους· (**9**) ἐπ᾽ ἐσχάτῳ δὲ ὁ σωλὴν ἐχέτω ἑκατέρωθεν γιγγλυμωτὰς σανίδας συγκλειομένας καλῳδίοις, ὧν χαλασθέντων καὶ πιεσθεισῶν

C

(**1**) With these things prepared before the attack that is expected to occur, it is necessary to instal all the artillery at the places appropriate to each.

(**2**) <…> and to be especially sparing of the troops and the citizens in respect of the combats that occur, and not to allow them to make rushes at *[91]* random and be wounded – (this) in order that when there is a need you may have the combatants in the opportune circumstances.

(**3**) <…>. After this, <against> rock-projectors it is good practice to hang down in front of the wall planks bound together out of date-palms – for they are strong and hard to set alight – and then paddings in front of them, where (the planks) are overlapped with each other, in order that their joins are not severed by the projectiles; (**4**) alternatively, pull down nets woven out of ropes and filled with seaweed. (**5**) At the top, out of the extending timbers, the cables of the planks and of the paddings are bound; and it is necessary to spread out screens in front of them, in order that the bonds are not severed by the projectiles. (**6**) (It is) useful to counterposition against each of the(se enemy rock-projectors) two ten-mina (4.37 kg.) stone-projectors, which it is necessary to transfer to wherever the enemy may move one of their rock-projectors, in order that by return fire you may, if you can, strike the engine and crush it.

(**7**) Against mining operations an ample trench is to be dug in the middle of (the space between) the wall and an outwork, equal in size to the depth of the foundations below ground, in order that the tunnellers, exposed to view, are easily killed and no longer come close to the wall.

(**8**) Against stoas [and machines] (it is necessary) to place three-talent (78.6 kg.) stones inside a pipe which has been extended from some machine within or a tower; (**9**) let the pipe have at its (outer) end, on each side, hinged planks tied together with cords; when these (cords) have been loosened and the planks have been squeezed,

τῶν σανίδων ὀλισθηρὸς <ὁ λίθος> ἐπιπεσεῖται ἐπὶ τὰς στοάς· καὶ πάλιν τῶν καλῳδίων συγκλεισθέντων [ὅλος ὁ λίθος] ταὐτὸ ἔσται. **(10)** Ὡσαύτως δὲ ἀπὸ τῶν μηχανημάτων καὶ ἀπὸ κεραιῶν λίθους μεγίστους ἀφιέντας καὶ τοῖς πετροβόλοις ἄνω βάλλοντας [τοῖς παλιντόνοις καὶ τοῖς μοναγκῶσι], διὰ δὲ τῶν καταξύρων θυρίδων τῶν ταλαντιαίων λίθων κάτω ἀφιέντας πειρᾶσθαι διακόπτειν τὰς ὀροφάς. **(11)** Ἐκ δὲ τῶν ἐπὶ τῇ στέγῃ κειμένων κατὰ μέτωπον τύπτοντας <ἢ> ἐκ τῶν πλαγίων καταβάλλειν αὐτάς. **(12)** Ἐὰν δὲ ὦσιν ἐκ γέρρων πεποιημέναι, καὶ τοὺς πυροφόρους εἰς αὐτὰς ἀφεῖναι· καιρὸν δὲ λαβὼν ἐκπέμψας στρατιώτας ἔμπρησον. **(13)** Ἐὰν δὲ ὦσιν ὀρυκταί, ὕδωρ θαλάσσης ἄνες εἰς αὐτὰς τοῖς περιάκτοις τροχοῖς <ἢ> ἐὰν ἄλλον τινὰ δύνῃ τρόπον, καὶ τῷ ἐνετῆρι καὶ τοῖς πετροβόλοις ἄνωθεν τύπτοντας κελεύειν διακόπτειν τὰς ὀροφὰς αὐτῶν.

(14) Πρὸς δὲ τὰ μηχανήματα ὅταν ἐγγὺς ᾖ, καὶ τοὺς κριοὺς καὶ τὰς ἐπιβάθρας, πρῶτον μὲν κατὰ τοῦτον τὸν τρόπον ἐπᾶραι τὸ τεῖχος <μὴ> καθελόντας τοὺς προϋπάρχοντας προμαχῶνας, ἀλλ᾽ ἐπ᾽ αὐτῶν τῆν οἰκοδόμησιν πεποιημέ- [92] νους καὶ ἄλλους ἄνωθεν κατασκευάσαντας κατάστεγον ποιῆσαι ταύτῃ τὸ τεῖχος, ὅπως ἂν ὑπάρχωσί τε διπλοῖ πρὸς τὴν χρείαν <καὶ> ὅπως, ἐὰν [πρὸς] τὴν ἐπιβάθραν ἐπιβάλλωσι, κάτωθεν ῥᾳδίως διὰ τῶν προμαχώνων ἐμπρήσωμεν αὐτήν, ἄν τε τοὺς ἄνωθεν προμαχῶνας ἀποκόπτωσι, κρίκους καὶ βρόχους προσάγοντες ἐκ τῶν κατὰ τοὺς <κάτω> προμαχῶνας ὄντων διαστημάτων εὐχερῶς <πα>τάξωμεν αὐτούς. **(15)** Ἐκτρυπήσαντες <δὲ> [αὐτοὺς] ταύτῃ καὶ τὸ τεῖχος κατὰ τοὺς ἁρμόζοντας τόπους, κορμοὺς κατασκευάζωμεν κατὰ τὰς θυρίδας περιτρέχοντας καὶ τῷ κριῷ τῷ ἀντισκευασθέντι τούτοις τύπτοντες ἄνωθεν τῆς ἐσχάρας τὸ μηχάνημα καὶ τὸν κριὸν καὶ τὸν τρύπανον καὶ τὸν κόρακα καί ὃ ἄν προσάγωσι, συντρίβωμεν ἀχαλέπως· **(16)** αἱ δὲ περιφερεῖς δοκοὶ τούτων ἕνεκα πλάγιαι παρὰ τὰ ἐκτρυπήματα τίθενται, ἵν᾽ εὐχερῶς ὁ κριὸς ἔξωθέν τε καὶ πάλιν ἔσωθεν παραλαμβάνηται περιτρεχόντων τῶν κορμῶν τὴν κίνησιν ὁποίαν οὖν νοεῖς. **(17)** Κατασκευαστέα τέ ἐστιν αὐτῷ κριόστασις ὡς ἀσφαλεστάτη πρὸς τὸ τοὺς ὠθοῦντας αὐτοὺς καλῶς βεβηκότας ὡς σφοδρότατα συντελεῖν τὰς πληγάς.

<the stone> will slip and fall onto the stoas; and when the cords have been tied together again it will be the same (as before). **(10)** Similarly, by releasing very large stones from the machines and from cranes, and firing upwards with rock-projectors [both palintone and one-armed], and also when releasing one-talent (26.2 kg.) stones downwards through the shaved-off windows, (it is possible) to try to cut through the(ir) roofs. **(11)** Also (it is possible) to destroy them by striking them, frontally or laterally, (with blows) from the (machines) placed on the platform. **(12)** If (such stoas) are made out of wicker, discharge your incendiaries into them too; and take an opportunity to send out troops and set fire to them. **(13)** If they are dug in, release seawater into them with rotating (water-)wheels <or> by any other means you can, and order their roofs to be cut through by striking them from above with the blower and rock-projectors.

(14) Against machines when they are close, and rams and assault-bridges, first raise the wall in this manner: do not remove the existing battlements but create the building-process upon them [92] and, by having others on top, make the wall covered at that place; (this is) in order that duplicate (battlements) are available for emergencies, and in order that if they do deploy the assault-bridge we may easily set it on fire from below through the (lower) battlements; and were they to sever the battlements above, we would readily afflict them by deploying rings and nooses out of the gaps there are in the battlements <below>. **(15)** When we have also bored out the wall here at appropriate places, we should prepare in the windows logs that (can) rotate, and by striking at these above the platform, with the ram that has been prepared as a counter(-weapon), we should crush the machine and the ram and the drill and the raven, and whatever they may deploy, without difficulty; **(16)** it is because of these that the rounded joists are placed horizontal beside the borings, in order that the (counter-)ram going out and back in again may readily match the motion of the logs as they rotate, whichever you so intend. **(17)** Also to be provided for is a ram-emplacement as secure as possible, with a view to giving the pushers themselves a good stance for completing their blows as vigorously as possible.

(**18**) Ἀντοικοδομητέον τέ ἐστι καὶ ταύτῃ τρίγωνον
τεῖχος <ἔσω> τὸ ἔμβολον ἔχον, δι᾽ οὗ θυρίδες ἑκατέρωθέν
εἰσιν οὐκ ὀλίγαι ποιητέαι πρὸς τὸ ἐὰν πέσῃ τὸ
μεταπύργιον ταύτῃ τοὺς βαδίζοντας ἔσωθεν τραυ-
ματίζεσθαι εἰς τὰ πλάγια ὑπό τε τῶν βελῶν καὶ
τῶν στρατιωτῶν, ἔτι δὲ ὑπὸ τῶν πολιτῶν. (**19**) Δεῖ δὲ καὶ
βάλλειν ἐκ τῶν καρβατίνων λίθοις ὡς μεγίστοις
τοὺς πλησιάζοντας τῷ τείχει. (**20**) Ἐὰν δέ τι τοῦ τείχους
ἢ τῶν πύργων ἁλίσκηται, ἀποσπαστέον τέ ἐστιν τὴν
τάχιστην τὰς πρώτας ὀροφὰς καὶ τὰς καθαι-
ρέσεις ἀναιρετέον ἀποικοδομήσαντα τὰς ἑκα-
τέρωθεν οὔσας <διόδους> τῶν πύργων· (**21**) τὰς δὲ πρὸς τὰ
μεσοπύργια ἔσωθεν ὑπαρχούσας καταλειπτέον,
ἵνα ἔχωμεν τοῖς πύργοις ταύτῃ βοηθοῦντες κτεί-
νειν τοὺς βιαζομένους αὐτούς. (**22**) Τούτου δὲ γενομένου
ταχὺ πάντες ἀπολοῦνται οἱ ἀναβάντες ἐπὶ
τοὺς πύργους ἢ τὸ μεταπύργιον [τὸ] τυπτόμενοι τοῖς
βέλεσι καὶ οὐκ ἔχοντες οὐδαμῆ ἀποχωρῆσαι ἀλλ᾽
ἢ εἰς τὸ ὀπίσω πάλιν ἐργωδῶς. (**23**) Ἐπιθετέον δέ ἐστι
καὶ ταῖς καθηκούσαις πρὸς τὸ τεῖχος οἰκίαις προ-
μαχῶνας καὶ τοῖς ἀμφόδοις ἑκατέρωθεν πύλας
κατασκευαστέον καὶ ἐκ τῶν πλαγίων τοίχων ὀπὰς
ποιητέον, δι᾽ ὧν τοῖς τε ἀκοντίοις καὶ ταῖς ζιβύναις
καὶ τοῖς βουπόροις ὀβελίσκοις ἔσται τύπτειν εἰς τὰ
πλάγια τοὺς εἰς τὰ ἄμφοδα βιαζομένους· (**24**) καὶ τὰς
ἑσταμένας οἰκίας πρὸς τοῖς εὐρυχώροις καὶ τοῖς ἀμ-
φόδοις ἐγγιζούσας ὁμοίως κατασκευαστέον ἐστίν.
(**25**) Καὶ κατὰ τὰς τιμήσεις τῶν οἰκιῶν ἀφοριστέον ἐστίν,
ὅσας τε λόγχας καὶ τοξεύματα προσῆκον εἶναι καὶ
λίθους μεγάλους καὶ χειροπληθεῖς καθ᾽ ἑκάστην
[*93*] οἰκίαν· (**26**) δημοσίᾳ τε εἰς ἕκαστον ἄμφοδον δοτέον ἐστὶν
λιθοβόλον δέκα μνῶν καὶ καταπάλτας δύο τρι-
σπιθάμους· (**27**) καὶ τοῖς μὴ κεκτημένοις ὅπλα μηδὲ δυ-
ναμένοις [καὶ μὴ δυναμένους] κατασκευάσασθαι δημοσίᾳ δοτέον ἐστίν.

(**28**) Ἐκκοιτίας τε καὶ ἐφοδείας τὰς προσηκούσας ποιητέον,
<ἐν> αἷς χρήσονται ξυλίνοις λαμπτῆρσιν, ἵνα ὑπὸ τοὺς πό-
δας μόνον φαίνωνται καὶ μὴ καταφανεῖς ποιῶσι τοὺς
ἐφοδεύοντας τοῖς ὑπεναντίοις. (**29**) Τούτοις δὲ καὶ τοῖς ἀμ-
φοδάρχαις συνθήματα καὶ ὑποσυνθήματα παρὰ
τῶν στρατηγῶν δίδοσθαι δεῖ, τὸ μὲν φωνῆεν, τὸ δὲ ἄφω-
νον.

(**30**) Δεῖ δὲ κεκλεῖσθαι τὰς πύλας καθάπερ καὶ τὰς τῆς
πόλεως καὶ τὰς τῶν ἀμφόδων, ἵν᾽ ἐάν τινες τῶν πολε-

(**18**) Also to be built here is a triangular counter-wall – with the point <inwards> – through which plenty of windows are to be made on both sides. The aim of this is that if the curtain should fall here, those advancing inwards will be wounded in the flanks by both the artillery and the troops, and also by the citizens. (**19**) It is also necessary to strike those coming close to the (city) wall with stones as large as possible (thrown) out of leather-hides. (**20**) If any (part) of the wall or of the towers is captured, what is necessary, as quickly as possible, is for the nearest (house-)roofs to be torn off and the debris collected for barricading the <through-ways> that there are on both sides of the towers; (**21**) but the existing (through-ways) within, (leading) to the curtains, are to be left alone, in order that here we may be in a position to defend the towers and kill the men overpowering them. (**22**) Once this is done, those who have climbed up onto the towers or curtain(s) will perish quickly, being struck by projectiles and having no way to withdraw except by arduously going back again. (**23**) Also, battlements should be placed on appropriate houses near the wall, and gates should be provided for the amphoda at each end, and holes should be made (coming) out of the flanking (house-)sides, through which it will be possible to strike with javelins and lances and ox-piercing spits into the flanks of those forcing their way into the amphoda; (**24**) and the houses which stand next to the open spaces and are close to the amphoda are to be provided for likewise. (**25**) When the houses are being evaluated (for taxes) it should be determined how many spears and arrows and stones, large and hand-sized, are appropriate for each [*93*] house (to have). (**26**) At public expense a ten-mina (4.37 kg.) stone-projector and two three-span (0.693 m.) catapults are to be issued to each amphodon; (**27**) and men who do not possess arms and are unable to equip themselves should be given them at public expense.

(**28**) Suitable (arrangements for) night-watches and sentry-rounds are to be made, in which (latter the men) will use wooden lanterns, in order that they would reveal only (what is) underfoot and would not make the sentries conspicuous to the enemy. (**29**) To these (sentries) and to the amphodarchs it is necessary that passwords and password-supplements be given from the generals: the one (category) spoken, the other silent.

(**30**) It is also necessary that the gates be kept closed, those of the city and those of the amphoda alike, in order that if any of the enemy who have broken in to the city

μίων νυκτὸς ἢ ἡμέρας ἐμβαλόντες εἰς τὴν πόλιν
παρεμπέσωσιν καὶ καταλάβωνταί τινας τόπους,
πρῶτον μὲν τοῖς καταπάλταις καὶ τοῖς λιθοβόλοις,
ἔτι δὲ <τοῖς> τοξεύμασι καὶ τοῖς λίθοις πάντοθεν τυπτόμε-
νοι κακὰ πάθωσιν, μετὰ δὲ ταῦτα ἐκφοιτῶσι καὶ
βοηθῶσιν οἱ πολῖται καὶ στρατιῶται ἐκ τῶν ἐκκοι-
τιῶν καὶ τῶν ἀμφόδων συντεταγμένοι καὶ ἡγεμόνας
ἔχοντες ἐπιτιθῶνταί <τε> τοῖς πολεμίοις ὅταν ὑπο-
λαμβάνωσι καιρὸν εἶναι, καὶ ἐάν τι διασφάλλωνται,
ἔχωσιν εἰς ἀσφαλὲς ἀποχωρεῖν ἐχόντων τῶν ἀμ-
φόδων πύλας· **(31)** οἵ τε παῖδες καὶ αἱ δοῦλαι
καὶ αἱ γυναῖκες καὶ αἱ παρθένοι τύπτωσιν ἀπὸ τῶν
στεγῶν καὶ πάντες ὅσι κατὰ τὴν πόλιν ἐνεργοί. **(32)** Ὀρθῶς
δ᾽ ἔχει καὶ κατά τινας τόπους ἔνδοθεν ἀντιτα-
φρεύειν καὶ κρύπτειν τὰς τάφρους, ἵνα ἐὰν πεσόντος
τοῦ τείχους εἰσβιάζωνται οἱ πολέμιοι, πολλοὶ δι᾽
ἄγνοιαν αὐτῶν φθείρωνται. **(33)** Δεῖ δὲ καὶ τὴν ταχίστην
καθ᾽ ὃ ἂν πέσῃ τὸ τεῖχος χάρακα θεμένους καὶ
φορμοὺς γῆς ἐμπλήσαντας προτείχισμα κατα-
σκευάσαι.

(34) Καὶ οἷς ἂν ἀπιστῇς τῶν στρατιωτῶν ἢ τῶν
πολιτῶν, ὀρθῶς ἔχει μεταλλάσσειν αὐτῶν τὰς
ἐκκοιτίας καὶ τὰς φυλακὰς καὶ μὴ εἰδέναι αὐτούς,
καθ᾽ ὃν τόπον φυλάξουσι τὸ τεῖχος, ἵνα μὴ δύ-
νωνται προδοῦναι τοῖς πολεμίοις τὴν πόλιν. **(35)** Με-
ταλλακτέον δέ ποτ᾽ ἐστὶ καὶ τὰ συνθήματα,
ἵνα ἐὰν τῶν ἔνδοθέν τις κακουργῶν τὸ σύνθημα
δῷ τοῖς πολεμίοις ἢ αὐτοὶ <ἑαυτοὺς> νυκτὸς ὑποτάξαντες τῷ
τείχει λάβωσιν, ἀχρεῖον αὐτοῖς ᾖ γενομένης τῆς
μεταλλαγῆς. **(36)** Τὰ <δ᾽> ὑποσυνθήματα ἄφωνα δί-
δοται πρὸς τούτῳ <ἵνα> κἂν ἀκούσωσιν οἱ πολέμιοι τὸ σύν-
θημα, καταφανεῖς γίνωνται οἱ λάθρα ἐπὶ τὸ
τεῖχος ἀναβάντες. **(37)** Ἔστι δὲ τὰ ὑποσυνθήματα τοιαῦτα·
ἀπαιτήσαντος δεῖ τὸ σύνθημα ἀφελέσθαι τὴν
καυσίαν ἢ τὸν πῖλον ἢ τὴν περικεφαλαίαν ἐὰν ἔχῃ
ἢ πρόκωπον τὸ ἐγχειρίδιον ποιῆσαι ἢ τὴν δεξιὰν
ἐμβαλεῖν ἢ τῆς χλαμύδος ἐπιλαβέσθαι. **(38)** Ξένα
δὲ καὶ διπλᾶ δοτέον ἐστὶ τὰ συνθήματα, ἵν᾽
ἐργωδῶς οἱ πολέμιοι καταμανθάνωσιν αὐτά,
ἐὰν [δὲ] ἐξάκουστον ἀπὸ τοῦ τείχους τι γένη-
[*94*] ται.

(39) <…> καὶ αὐτῶν τὰς δοκίδας καὶ τὰς προστιθε-
μένας κλίμακας ἐκ τοῦ πλαγίου τύπτοντας τοῖς

at night or by day should rush down and capture certain places, they would first suffer badly when struck by the catapults and stone-projectors, as well as by arrows and by stones from all directions, and after that the citizens and troops would issue forth from the night-watches and the amphoda and bring help; in formation and under command they would fall upon the enemy when they saw an opportunity, and were they to fail in something, they would be in a position to withdraw to a safe place because (our forces) are holding the gates of the amphoda; **(31)** and the children and the slave-women and the (free) women and the girls would strike (them) from the rooftops, and everyone throughout the city would be in action. **(32)** It is also good practice to employ counter-trenching at certain places inside and to conceal the trenches, in order that if the enemy force an entry after the wall has fallen, many would perish through ignorance of the(se trenches). **(33)** It is also necessary, wherever the wall might fall, immediately to put in place a palisade and to provide an outwork by filling baskets of earth.

(34) Also, as regards those of the troops or the citizens whom you might distrust, it is good practice to change their night-watches and their guard-duties and not to (let them) know which place on the wall they will be guarding, in order that they cannot betray the city to the enemy. **(35)** And the passwords are to be altered occasionally, too, in order that if someone on the inside, acting wickedly, were to give the password to the enemy – or if they themselves seized it by posting <themselves> below the wall at night – it would be useless to them because the alteration has happened. **(36)** Silent password-supplements are given as well, <in order that> even if the enemy were to hear the password, those who have climbed up on the wall would become conspicuous. **(37)** Examples of password-supplements are: when (someone) has asked for the password, (the addressee) must take off his hat or cap or helmet if he has one, or grip his sword by the hilt, or put in his right hand (to the other man's), or take hold of the (other's) cloak. **(38)** The passwords given should be strange and double, in order that the enemy find it troublesome to learn them, if anything becomes audible (away) from the [*94*] wall.

(39) <…> and their screens and the ladders being deployed, when (you) strike them from the flank with stone-projectors, are easy to crush and to thrust away from the

λιθοβόλοις ῥᾳδιόν ἐστι συντρίβειν καὶ ἀπορ-
ρίπτειν ἀπὸ τοῦ τείχους, ἢ τῇ νάφθᾳ, ἐὰν ἔχῃς,
ῥάναντα καὶ λαμπάδας ἄνωθεν ἐμβαλόντα
κατακαῦσαι· **(40)** ὡσαύτως δὲ καὶ τὰς χελώνας καὶ τὰ
μηχανήματα ὅταν ἐγγὺς γένηται τοῦ τειχίσματος ἐμ-
πιπράναι. **(41)** Ἀφετέον δέ ἐστιν ὡς αὐτὰ καὶ πυ-
ροφόρους ὡς πλείστους καὶ τριβόλους καιομένους
στιππύῳ περιειλι<γμένους. **(42)** … Χρη>στέον δέ ἐστι καὶ ταῖς πάλιν προ-
δοσίαις καὶ ταῖς γινομέναις νυκτὸς καὶ ἡμέρας ἐπι-
θέσεσιν ὅταν λάβῃς καιρόν· **(43)** οὕτως γὰρ ἂν τάχιστα
κατατυχὼν λύσαις πολιορκίαν. **(44)** Ἐν δὲ ταῖς ἐμπρή-
σεσι τῶν μηχανημάτων καὶ τῶν χελωνῶν <καὶ> ταῖς
συμβαινούσαις ἐπιθέσεσι δεῖ τοὺς ὁπλίτας καὶ
τοὺς ψιλούς, ὅσοι ἂν μὴ ἐπὶ τῶν τείχων ὦσι
χρήσιμοι, πάντας διεσκευασμένους ἐν τῷ
προτειχίσματι ἑτοίμους εἶναι, ἵνα ταχὺ καὶ εὐ-
τάκτως ποιῶσι τὸ προσταττόμενον τῷ στρατη-
γῷ.

(45) Τοὺς δὲ γινομένους τραυματίας τῶν ξένων
ἐπιμελῶς θεραπεύειν πάντα τὰ δέοντα παρα-
σκευάζοντας, καὶ ὅσοι ἂν μὴ ἔχωσιν αὐτῶν
τοὺς θεραπεύοντας, εἰς τὰς τῶν πολιτῶν οἰκίας
διδόναι· **(46)** καὶ ὅσοι ἂν ἄνδρες ἀγαθοὶ γίνωνται,
ἀναβιβάζειν χώραν καὶ ἡγεμονίαν διδόναι καὶ στε-
φανοῦν· **(47)** καὶ ἐάν τινες τελευτήσωσιν, θάπτειν
ὡς λαμπρότατα δημοσίᾳ, καὶ ἐὰν καταλίπωσιν
ἑαυτῶν τέκνα ἢ γυναῖκας, πολυωρεῖν μὴ παρέρ-
γως· **(48)** μάλιστα γὰρ οὕτως εὔνοοι γινόμενοι τοῖς
στρατηγοῖς καὶ τοῖς πολίταις ἄριστα ἂν κιν-
δυνεύσειαν.

(49) Ἐὰν δὲ ὁ τόπος καθ᾽ ὃν προσβάλλουσι κα-
τάντης ᾖ, ἀφετέον ἐστὶ τοὺς τροχοὺς δρέπανα
ἔχοντας ἢ λίθους μεγάλους· **(50)** οὕτω γὰρ ἂν τά-
χιστα καὶ πλείστους διαφθείραις τῶν ἐναντίων.

(51) Ἐὰν δὲ ἐκ θαλάσσης ἡ προσαγωγὴ συν-
τελῆται, κατὰ τὰς ἀποβάσεις θύρας τε κρυ-
πτὰς ἥλους ἐχούσας δεῖ τιθέναι καὶ τριβό-
λους καὶ σιδηροῦς καὶ πυξίνους διασπείρειν καὶ
ἀποχαρακοῦν τοὺς εὐεπιβάτους τόπους. **(52)** Τὰ
δὲ στόματα τῶν λιμένων φράττειν ἱμητοῖς
κλείθροις, ἐν οἷς <χῶναί> εἰσι περιτρέχουσαι καὶ στρογ-
γύλαι, σιδηροῦς δὲ κόλπους ἔχουσαι· **(53)** ἢ ἐσχά-

wall; alternatively sprinkle them with naphtha, if you have it, and hurl torches on and burn them up; **(40)** in the same way (it is easy) to set alight tortoises and machines when they come near the wall. **(41)** Also to be discharged on them are incendiaries in the greatest possible numbers and burning *triboloi* wrapped in oakum < … **(42)** …> to be used also are counter-treacheries and attacks occurring at night and by day, whenever you can seize an opportunity; **(43)** for by doing so successfully you might raise a siege most quickly. **(44)** In setting fire to machines and to tortoises and in the attacks that take place it is necessary that the hoplites and the light-armed, except those performing useful functions on the walls, should all be prepared (and) ready on the outwork, in order that they may do what the general assigns to them quickly and in good order.

(45) When there are wounded amongst the foreigners, look after them carefully by preparing everything that is needed, and place in the houses of the citizens any who do not have people of their own looking after them; **(46)** and for those who behave as brave men, advance their position and give them a command and crown them; **(47)** and if any die, bury them as lavishly as possible at public expense, and if they leave behind their children or wives, be systematically solicitous; **(48)** for thus, especially well-disposed towards the generals and the citizens, they would fight as best they can.

(49) If the place at which (the enemy) are attacking is downhill (from the wall), wheels equipped with scythes should be released, and large stones; **(50)** for that is how you might destroy the greatest number of the enemy most quickly.

(51) If the (enemy) approach is effected from the sea, it is necessary to position at the disembarcation-points concealed doors which have (protruding) nails, and to spread *triboloi* of both iron and boxwood, and to close off the easily-accessible places with palisades. **(52)** Fence in the mouths of the harbours with strung-out barriers, on which there are <buoys>, rotating and spherical, which have iron hollows;

ρας ἐπὶ τοῦ τόπου τίθεσθαι καὶ λίθους ὡσεὶ
χωστοὺς καὶ μεγίστους ἐπιβάλλειν, ἐν οἷς <ἐμπήγνυσθαι> τοὺς
καθαρμόττοντας σταυροὺς λοξοὺς σεσιδη-
ρωμένους, ὑπαλλάττοντας ἀλλήλοις καὶ συν-
δεδεμένους, οὐχ ὑπερέχοντας τῆς θαλάσσης
ἀλλ᾽ ὅσον παλαιστὴν ἀπολείποντας· (**54**) ἢ πλοῖα
ἐναντία πολεμιστήρια ὅπλα ἔχοντα, εἰ δὲ
μή, λέμβοι καὶ ὧν ἂν ἔχῃς τὰ λεπτὰ προσ-
[*95*] ορμισθέντα πρὸς ἄλληλα συναρτᾶται καὶ συμ-
βολαὶ κατασκευάζονται αὐτοῖς δοκῶν παχεῶν τε-
τραγώνων πρὸ τῆς πρῴρας τεθεισῶν, καὶ τούτων συγγομ-
φωθεισῶν καὶ συνδεθεισῶν εἰς τὸ αὐτό, καὶ ἐπ᾽
ἄκρῳ ἐμβόλου περὶ αὐτὰ καθαρμοσθέντος. (**55**) Πα-
ρὰ πάντα τὰ εἰρημένα κλεῖθρα καὶ ζεύγματα
καὶ πλοῖα ἀκάτια παρορμείτω πίσσαν καὶ θεῖον
καὶ τριβόλους ἔχοντα στιππύῳ περιειλιγμένους· καὶ
ἐν ταῖς ὁλκάσι ταῦτα καὶ <τὰ τοιαῦτα> ἐνέστω. (**56**) Καὶ ἐπὶ τοῦ στόματος
[καὶ ἐφ᾽] ἑκατέρωθεν ἐφεστάτω πετροβόλος εἰκοσα-
μναῖος, ἵνα ὅταν βιάζωνται τῶν μικρῶν τινες
εἰς τὸν λιμένα, ἐμπρησθῶσιν ἢ περὶ τοὺς ἐμβό-
λους περιπαγεῖσαι διαφθαρῶσι<ν ἢ> καταπον-
τισθῶσιν τυπτόμεναι τοῖς τε μολιβοῖς ἀμφορεῦσι
καὶ τοῖς πετροβόλοις. (**57**) Ἐὰν δέ μέγα τι τὸ διά-
στημα ᾖ, καὶ πύργος ἐν μέσῳ σταθήτω, ἐν ᾧ
πετροβόλος ἔστω τριακοντάμνους· (**58**) πρὸς δὲ τὰ
προσαγόμενα <μηχανήματα> καὶ τὰς προσπλεούσας ναῦς
μάλιστα δεῖ χρᾶσθαι τοῖς πετροβόλοις καὶ τοῖς
πυροφόροις καὶ τοῖς δορυβόλοις. (**59**) Ἐὰν δὲ ἀγχι-
βαθεῖς τόποι τῶν τείχων ὦσι, προσχώματα κατα-
σκευαστέα ἐστίν, ἵνα μήτε προσαγωγὴν ἔχῃ
ταύτῃ μήτε τῶν μεγάλων σκαφίων ἔμβολος εἰς
τὸ τεῖχος ἐμβάλῃ ἢ ἐπιβάθρας ἐπιθέντες κα-
ταλάβωνταί τινα πύργον. (**60**) Δεῖ δὲ καὶ νυκτός, ὅταν
ᾖ χειμών, τὰς ἀγκύρας τῶν ἐφορμουσῶν νηῶν
κελεύειν τοὺς κολυμβῶντας ὑποτέμνειν καὶ τὰ ἐ-
δάφη αὐτῶν ἐκτρυπᾶν· (**61**) μάλιστα δὲ οὕτω κω-
λύσομεν τοὺς ἐναντίους ἐφορμίζειν. (**62**) Τὰ δ᾽ ἄλλα
πάντα χρήσιμα ἐν ταῖς τοιαύταις προσβολαῖς
ὅσα καὶ πρὸς τὰς ἐκ τῆς ἠπείρου γινομένας
προσαγωγάς.

(**63**) Ἐὰν δὲ μακρᾶς οὔσης τῆς πόλεως ἀμ-
φίβολον ᾖ τι τοῦ τείχους, διοικοδομητέον ἐστὶ τοίχῳ
ἢ δέρρει ἢ αὐλαίαις διαφρακτέον, ἵνα μὴ τι-
τρώσκωνται ἐκ τοῦ ὄπισθεν οἱ ἐπὶ τοῦ τείχους
ὄντες.

(**53**) or position (underwater) platforms at the place and put on them stones as if (for) embankments and large, on which <you fix> suitable stakes, slanting (and) ironclad, alternating with each other and bound together, not protruding above sea-level but at a palm (7.7 cm.) below; (**54**) or ships carrying weapons of war – or if not, *lemboi* and whatever light vessels you may have – [*95*] anchored opposite (the harbour mouth) are attached to each other, and prepared for them are conjunctions of joists thick (and) square (and) placed in front of the prow(s), and with these dowelled together and bound together into one, and a beak fastened on them at the end. (**55**) Near all the barriers and bridges and ships mentioned, let rowing-boats be at anchor, carrying pitch and sulphur and *triboloi* wrapped in oakum; and let these and <suchlike> (commodities) also be in the cargo-vessels. (**56**) And at the (harbour-) mouth on either side let a twenty-mina (8.73 kg.) rock-projector be installed, in order that when any of the small (craft) force their way into the harbour they would be set on fire or destroyed after being skewered on the beaks <or> sunk while struck by both lead amphoras and rock-projectors. (**57**) If the distance (across the mouth) is large, let a tower, too, stand in the middle, in which there should be a thirty-mina (13.1 kg.) rock-projector; (**58**) and against the <machines> being deployed and the ships approaching it is necessary to use rock-projectors and (catapults which fire) incendiaries and spear-projectors. (**59**) If stretches of the walls are by deep water, (offshore) mounds are to be prepared, in order that there is no access at this point and that a beak of (one of) the large vessels does not penetrate into the wall and that (the enemy) do not put assault-bridges in place and capture a tower. (**60**) It is also necessary at night, when the weather is stormy, to order the divers to undercut the anchors of the blockading ships and to drill out their bottoms; (**61**) this will be a particularly good way for us to prevent our opponents from bringing their ships to anchor. (**62**) All other (tactics) useful in such (seaborne) attacks are the ones also (effective) against approaches made from the mainland.

(**63**) If, in a city which is elongated, any part of the wall can be attacked from both sides, it is to be built-across by a (partition-)wall or fenced-across by a screen or by drapes, in order that the men on the wall are not wounded from behind.

(64) Ἐπειδὰν δὲ τῷ προσαγομένῳ μηχανήματι ὁδοποιηθῇ, πέτρους ὡς μεγίστους προσρίπτειν ἐκ τῶν πετροβόλων, μὴ στρογγύλους, ἵνα μὴ δύνωνται τὴν ἐλέπολιν προσάγειν.

(65) Χρήσιμα δ' ἐστὶ καὶ τὰ προκαταρτιζόμενα παχέα ἀμφίβληστρα ἐκ τοῦ λίνου πρὸς τοὺς κατὰ τὰς κλίμακας <καὶ> διὰ τῶν διαβαθρῶν ἐπὶ τὰ τείχη ἀναβαίνοντας· ὅταν γὰρ ἐπιρριφῇ αὐτοῖς, ῥᾳδίως συνθέοντος ὑποχείριοι γίνονται. (66) Καὶ τὰ ἀγχιστρωτὰ ἐμβόλια· ἀπὸ γὰρ τῶν καλῳδίων εὖ ἐξακοντιζόμενα καὶ ἄνωθεν ἐμβαλλόμενα, ὅταν ἐμπαγῇ εἰς τὰ μαλάγματα καὶ τὰς ῥυτὰς σανίδας <καὶ ἀνασ>πάσῃ τὰ καλῴδια, πολλὰ ἀποσπᾶν αὐτῶν δύναται.

(67) Πάντων δὲ μάλιστα δεῖ σπουδάζειν περὶ τοὺς τριακονταμναίους πετροβόλους καὶ τοὺς χρωμένους τοῖς ὀργάνοις τού- [96] τοις καὶ τὰς βελοστασεῖς αὐτῶν, ἵνα ὦσιν ὡς βέλτιστα πεποιημέναι· (68) τῶν γὰρ λιθοβόλων οὕτως εὖ πεποιημένων καὶ τῶν βελοστάσεων ἐπὶ τῶν ἐπικαίρων τόπων κατὰ τρόπον ἐπεσκευσαμένων καὶ τῶν χρησομένων αὐτοῖς ἐντέχνων ὄντων οὔτ' ἂν [γερροχελώνη] μηχάνημα οὔτ' αὖ στοὰ οὔτε χελώνη ῥᾳδίως προσαχθείη· (69) ἐὰν δὲ πλησιάσῃ τῷ τέλει, οὐκ ἂν ὑποκινήσειεν οὐθὲν ὑπὸ τούτων τυπτόμενα. (70) Συμμεμέτρηται δὲ ταῦτα καὶ σφοδρότατα ταῦτ' ἐστὶ πρὸς τὰς πληγὰς τὰ βέλη· (71) ὥστε τούτων ἐνεργούντων μηθὲν ἂν δεινὸν κατὰ τὰς γινομένας προσβολὰς τὴν πόλιν παθεῖν.

(72) Δεῖ δὲ καὶ ἰατροὺς χαριεστάτους ἔνδον εἶναι ἐμπείρους τραυμάτων καὶ βελῶν ἐξαιρέσεως, ἔχοντας φάρμακα καὶ ὄργανα τὰ προσήκοντα, καὶ τὴν πόλιν χορηγεῖν κηρωτὴν καὶ μέλι καὶ ἐπιδέσμους καὶ σπληνία, ἵνα μὴ παραπολλύωνται οἱ στρατιῶται τραυματίαι γενόμενοι, ἀλλὰ ταχὺ ὑγιαζόμενοι χρήσιμοι γίνωνται ἐν ταῖς ὕστερον γινομέναις συμβολαῖς προθύμως κινδυνεύοντες διὰ τὰς γενομένας θεραπείας αὐτοῖς καὶ χορηγίας· (73) πολλάκις δὲ καὶ ταῦτα τῆς πόλεως ἐπὶ σωτηρίᾳ γίνεται.

(64) When a path has been made (by the enemy) for a machine being deployed, (it is necessary) to propel rocks as large as possible – but not spherical – out of the rock-projectors, in order that they are not able to advance the helepolis.

(65) Also, thick wrappings prepared out of linen are efficacious against men climbing up on the walls by means of ladders <and> across assault-bridges; for when (the wrappings) are thrown onto them, they bunch and (the men) are easily under control. (66) Also (useful are) barbed harpoons; for if well thrown out from their cords and (therefore) striking from above, when they sink into the paddings and the (?)dragged planks <and (someone)> pulls up the cords, it is possible to tear many of them away.

(67) But it is necessary above all to devote special care to thirty-mina (13.1 kg.) rock-projectors and to the men operating these engines and to their emplacements, in order that they are [96] made as good as possible; (68) for when stone-projectors have been well made thus, and the emplacements prepared in advantageous positions (and) in a (suitable) way, and the men who will use them are skilled, no [wicker-tortoise] machine or stoa or tortoise could easily be deployed; (69) but were (such things) to come close to their goal, they would be hit by these (stone-projectors) and not move on at all. (70) This artillery is commensurate with (such targets) and very powerful as regards its blows; (71) consequently, with this in action, the city would suffer nothing terrible in the assaults that occur.

(72) It is also necessary that there be, inside, very accomplished doctors, with experience of wounds and of the extraction of projectiles. They must have (their own) drugs and the appropriate instruments, and the city must pay for wax and honey and bandages and compresses, in order that the troops do not die when they are wounded, but regain their health quickly and become useful in subsequent engagements, fighting eagerly because of the care services and supplies provided; (73) often, too, it is these things which are favourable to the preservation of the city.

D

(**1**) Πρὸς μὲν οὖν πολιορκίαν οὕτω δὲ παρασκευάζεσθαι.

(**2**) Τὸν μέλλοντα λήψεσθαι τὰς πόλεις, ἐὰν προέληται, δεῖ μάλιστα μὲν ἑορτῆς οὔσης ἣν ἄγουσιν ἔξω τῶν πυλῶν, εἰ δὲ μή, ἀμητοῦ <ἢ> τρυγητοῦ ὄντος τὴν ἐπίθεσιν ποιεῖσθαι· (**3**) πλείστους γὰρ ἔξω τῆς πόλεως ἀπολαβὼν ἀνθρώπους ῥᾳδιέστατ᾽ ἂν λάβοις τὸ ἄστυ· (**4**) εἰ δὲ μή, νυκτός, χειμῶνος ὄντος ἢ μεθυόντων τῶν πολεμίων ἔν τινι δημοτελεῖ ἑορτῇ κλίμακας ἑτοίμους ἔχοντας λάθρα πλησιάσαντας τῷ τείχει τῶν πύργων τινὰς καταλαβέσθαι.

(**5**) Ἐὰν δὲ ἀποτύχῃς τούτου, ἐὰν μὲν ἐπιθαλάσσιος ᾖ ἡ πόλις, περιχαρακῶσαί τε ἐκ θαλάσσης εἰς θάλασσαν, καὶ ἐὰν ἔχῃς σκάφας μακράς, ἐπὶ τοῦ λιμένος ἐφορμεῖν, ἵνα εἰσπλέῃ μηθέν. (**6**) Ἐὰν δὲ μηδ᾽ οὕτως ἡ πόλις ᾖ ἐκτισμένη, βαλόμενος τὸ στρατόπεδον ἔξω βέλους ἐπὶ τοὺς ἀσφαλεστάτους τόπους, περιχαρακώσας κύκλῳ ὡς ἂν ᾖ δυνατόν, εἶτα φύλακας καταστήσας ποιοῦ τὴν πολιορκίαν, πρῶτον μὲν κήρυγμα ποιησάμενος μηθένα φθείρειν ἢ προνομεύειν, δεύτερον δὲ λογισάμενος εἰς τάγματα ἢ ἐπαρχίας διαδώσεις τὰ γεώργια· (**7**) καὶ οἱ στρατιῶται πάντα τὰ δέοντα ἕξουσιν καὶ οἱ πολῖται θᾶττον ὃ βουλόμεθα ποιήσουσιν ἀφθάρτων [97] τῶν κτημάτων ὄντων. (**8**) Μετὰ δὲ ταῦτα περὶ τὴν πόλιν ὅσα ἐστὶν ἢ ἀσφάλειαν <τοῖς> ἔνδον ἔχοντα ἢ ὠφέλειαν τὰ μὲν κατασκάψαντας τὰ δὲ ἐκκόψαντας καὶ τὰ ὕδατα τὰ ἔσω ῥέοντα ἀποστρέψαντα (οὕτω γὰρ [ἂν] μάλιστα δειλωθήσονται καὶ σὺ τοῖς ὀργάνοις ὡς βούλει χρήσῃ), εἶτ᾽ ἐὰν ᾖ ποταμὸς πλησίον, ἐπὶ τὸ τεῖχος <ἐφεῖναι>, ἵνα ἐὰν δύνῃ πεσόντος μεταπυργίου τινὸς ἢ πύργου κατάσχῃς τὴν πόλιν. (**9**) Ἐὰν δὲ μὴ τοῦτο δύνῃ, τότε τὰ βέλη ἐπιστήσας πάντα καὶ ἐπικηρύξας τῷ πρώτῳ ἀναβάντι ἐπὶ τὸ τεῖχος καὶ δευτέρῳ καὶ τρίτῳ δώσειν τὰ καλῶς ἔχοντα χρήματα, κατὰ τοὺς ἀσθενεστάτους τόπους ἀπὸ κλιμάκων καὶ προστιθεμένων δοκίδων τὴν

D

(**1**) So that is how one must prepare oneself for (withstanding) a siege.

(**2**) He who intends to capture cities must, for preference, make the attack during a festival which they are celebrating outside the gates; otherwise, at (grain-)harvest <or> vintage time; (**3**) for by intercepting most of the people outside the city you might most easily capture the town; (**4**) otherwise, at night, when there is a storm or when the enemy are drunk at some public festival, approach the wall secretly with ladders ready and seize some of the towers.

(**5**) If you fail in this: if the city is by the sea, palisade it round from sea to sea, and if you have warships, anchor them at the harbour, in order that nothing can sail in. (**6**) But if the city is not situated thus, position the camp out of range in (one of) the most secure places, encircling it with a palisade as far as is possible; then post guards and undertake the siege. First, make a proclamation that nobody is to ravage or forage. Secondly, calculate the agricultural produce and distribute it between (your) formations or command-units; (**7**) and (thus) the soldiers will have everything they need and the (enemy) citizens will more quickly do what we want [97] because their property is undamaged. (**8**) After this, as regards anything round the city that furnishes either security or benefit <to those> inside, eradicate some items and cut out others, and divert the waters that flow in – for thus they will be especially frightened and you, if you want, can (more easily) use your engines. Then, if there is a river nearby, <channel it> against the wall, in order that, if you can, you may gain possession of the city after the fall of a curtain or a tower. (**9**) If you are unable (to do) this, then is the time to put in place all your artillery and announce that the well established monies will be given to the first and second and third man who climbs up the wall; make the first assault at the weakest spots from (the use) of ladders and screens being brought forward, in order that, while those

πρώτην ποιῆσαι προσβολήν, ἵνα καταφόβων
ὄντων ἔτι τῶν ἔνδον καὶ ἀπείρων πολιορκίας,
κατὰ κράτος λάβῃς τὴν πόλιν ἢ διαγνῷς τὸ
πλῆθος τῶν μαχομένων ἢ τὰς ψυχὰς αὐτῶν
πῶς τε διάκεινται πρὸς τοὺς κινδύνους. (**10**) Ταῦ-
τα δὲ ποιήσας ἂν μή σοι προσέχωσιν, ἔπαλ-
ξιν ἐπὶ τοῦ χάρακος θέμενος καὶ τάφρον περὶ
τὸ στρατόπεδον περιβαλόμενος διπλῆν τά τε
μηχανήματα ἵστα ὑπότροχα καὶ πε-
ρίακτα κατασκευάζων καὶ φοινικίνας σανίδας
ἔχοντα, ἵνα μὴ συντρίβωνται· καὶ τὰς στοὰς οἰ-
κοδομεῖν καὶ τοὺς ἐπιτηδείους τόπους ὑπορύτ-
τειν, ἐὰν μὴ ὕπομβρος ᾖ ὁ τόπος, ἢ χε-
λώνας κατασκευασάμενος χωστρίδας τὰς τά-
φρους χώννυε τὴν χώραν μὴ φθείρων· ὕστερον
γάρ, ἐὰν συμφέρῃ, τοῦτο ἔσται σοι ποιῆσαι. (**11**) Ἐὰν δὲ
μὴ δύνῃ χῶσαι διὰ τὸ βαθείας καὶ εὐρείας
εἶναι, χελώνην δεῖ προθέμενον χωστρίδα σχε-
δίαν ζευγνύοντα προσαγαγεῖν οὗ βούλεται
τοὺς στρατιώτας.

(**12**) Ποιοῦ δὲ καὶ κηρύγματα τῶν
πολεμίων ἀκουόντων τοιαῦτα· <τοῖς μηνύσασιν> ὁπλίσεις τε σι-
δήρων ὑπορυκτικῶν καὶ μηχανημάτων στάσεις
καὶ τὰ τούτοις ἀκόλουθα, καὶ ἐὰν ἀποκτείνας
τις ἢ τῶν μηχανοποιῶν τινὰς ἢ τῶν ὄντων ἐπὶ τῶν
βελῶν ἀξιολόγων ἢ <ἐάν τις> τῶν ἐνδόξων ἐναντιου-
μένων τοῖς πράγμασι παραγίνηται πρὸς αὐ-
τούς, τιμήσειν καὶ χρήματα δώσειν· (**13**) καὶ τὸν μὲν
δοῦλον ἐλεύθερον ἂν ἀφεῖναι, τὸν δὲ στρατιώτην
ἀναβιβάσειν, τὸν δὲ ὁπλίτην μέτοικον στεφανώ-
σειν, καὶ δώσειν δωρεὰς τὰς κατ᾽ ἀξίαν τοῦ
πραχθέντος ἔργου. (**14**) Τὰ γὰρ τοιαῦτα κηρύγμα-
τα μάλιστά πως εἴωθε τῶν ἐναντίων τὰς
διανοίας <ταράττειν> καὶ τοὺς μετοίκους καὶ τοὺς οἰ-
κέτας ποιεῖν μηκέθ᾽ ὁπλίζειν καὶ διδόναι τὰ
καλῶς ἔχοντα ἐπιτήδεια· (**15**) τούτων δὲ γι-
νομένων ἐλάττους οἱ κινδυνεύοντες ἔσονται
καὶ πλείονα σῖτα ἀναλώσουσιν καὶ τάχα
[*98*] στάσις τις ἔσται ἐν τῇ πόλει. (**16**) Τοὺς δ᾽ ἀ-
χρείους ὄντας ἐὰν παραγίνωνται, μὴ προσδέ-
χου, ἵνα τροφὴ τῶν πολιορκουμένων θᾶτ-
τον ἀναλίσκηται.

inside are still fearful and lacking experience of a siege, you may take the city by force or (at least) discern the number of fighting men or their state of mind and how they are disposed toward combat. (**10**) Should doing these things bring you no advantage, furnish the palisade with a parapet and surround the camp with a double trench and set up machines with wheels underneath and make (them) rotating, fitted with date-palm planks, in order that they are not crushed; also (it is necessary) to build stoas and to undermine suitable sites – unless the site is subject to inundation – or to prepare filler tortoises and fill the (enemy) trenches without ruining the terrain, for that is something you will be able to do later, should it be expedient. (**11**) If you are unable to fill (the trenches) because of their being deep and broad, it is necessary to apply a filler tortoise yoked with a "raft" for conveying the soldiers where wanted.

(**12**) Make proclamations too, in the enemies' hearing, such as these: '<to those who have provided information about> (?)stockpiles of iron tools for undermining and locations of machines and similar things, and if anyone after killing some of the engineers or those who are noteworthy in respect of artillery or <if any> of the leading men opposed to the status quo comes to us, (him we promise) to honour and give money'; (**13**) and (you) would (promise) to free a slave, promote a soldier, crown a metic hoplite, and give rewards worthy of the action performed. (**14**) Proclamations of this kind are particularly likely, somehow, <to disturb> the minds of the opponents and make them no longer arm the metics and the slaves and give (them) the well-established rations; (**15**) in these circumstances the combatants will be fewer and they will consume more provisions (than others) and swiftly [*98*] there will be some sedition in the city. (**16**) If those who are of no use come to you, do not accept them, in order that the food of the besieged will be consumed sooner.

(**17**) Ταῦτα δὲ πάντα ὅταν
συντελέσῃς, ὁδοποιήσας καὶ φαλαγγώσας τὰς
προσαγωγὰς τοῖς μηχανήμασι τὴν ταχί-
στην αὐτὰ πειρῶ προσάγειν φράξας ταῖς
φοινικίναις σανίσι καὶ σιδηραῖς λεπίσι καὶ
μαλάγμασι καὶ χολέδραις ἄνωθεν κατα-
σκευάσας, καὶ τοὺς πετροβόλους καὶ τοὺς ὀξυ-
βελεῖς ἐπιστήσας, καὶ πρὸς τοὺς ἐκείνων λιθο-
βόλους δύο δεκαμναίους πρὸς ἕκαστον καὶ πεν-
τασπίθαμον ἀντιστήσας. (**18**) Μὴ φανερὸς δὲ γίνου
καθ᾽ ὃ ποιήσῃ τὴν προσαγωγήν, ἀλλὰ κατ᾽
ἄλλους μὲν προδείκνυε τόπους, κατ᾽ ἄλλους
δὲ πρόσαγε τὰ μηχανήματα, ἵνα διαμαρτά-
νωσι ταῖς παρασκευαῖς οἱ πολιορκούμενοι. (**19**) Πρὸ
δὲ τῶν κινδυνευόντων στρατιωτῶν προφερέ-
σθωσαν γερροχελῶναι ὡς πλεῖσται, ἵν᾽ εὐχερῶς
ἐντεῦθεν ἐκπηδῶντες κινδυνεύσωσιν. (**20**) Αὐτὸς δὲ
μάλιστα ἐν τοῖς ἀσφαλεστάτοις ἐρύμασιν ὢν
καὶ μάλιστα εὐλαβοῦ παραβοηθεῖν, προστάσσων
ἐάν που [δέος] δέῃ καὶ συνθεωρῶν, ἔτι τί
ποιητέον ἐστίν.

(**21**) Ὡσαύτως δὲ καὶ ἐκ θαλάσσης
ἐὰν <ποιῇ τὴν> προσαγωγήν, ἐπί τε τῶν ὁλκάδων καὶ
τῶν λέμβων στήσας μηχανήματα πρόσαγε·
(**22**) καὶ διασκάψας ταῖς μεγίσταις σκαφίσι τὸ κλεῖ-
θρον τοῦ λιμένος, ἐὰν ἔχῃς καταφράκτους ναῦς,
ποίησαι τὴν προσβολὴν τοῖς ἐμπειροτάτοις
οὖσι καὶ δυναμένοις κινδυνεύειν καὶ μάλιστα
κατὰ θάλασσαν. (**23**) Τὴν δὲ διάσπασιν τοῦ φράγματος
καὶ τῶν κλείθρων ἢ ταῖς ἐμβολαῖς τῶν νηῶν
ποιητέον ἐστὶν ἢ ταῖς ἐνάψεσι τῶν ἀγκυρῶν
<ὀ>νεύοντα ἐκ τῶν προσαχθεισῶν ὁλκάδων.

(**24**) Ὅταν
δὲ προσαχθῇ τὰ μηχανήματα παρακαλέσας
τοὺς στρατιώτας καὶ τὴν αὐτὴν ἐπικήρυξιν τῇ
προτέρᾳ συντελέσας ποιοῦ τὴν προσβολὴν
πάντοθεν τῆς πόλεως καὶ κατὰ γῆν καὶ κατὰ
θάλασσαν, ἐὰν ἔφαλον ᾖ τι τοῦ τείχους, ἵνα
φόβον τε ὡς πλεῖστον παρασκευάσῃς καὶ δια-
σπάσῃς εἰς πολλὰ τοὺς ἔνδοθεν κινδυνεύον-
τας. (**25**) Ἐνεργῆ δὲ σοι τὰ βέλη πάντα ἔστω καὶ
οἱ κριοὶ καὶ τὰ τρύπανα καὶ οἱ κόρακες καὶ
αἱ ἐπιβάθραι καὶ κατὰ γῆν καὶ κατὰ θάλατταν εἰς

(**17**) When you have completed all these preparations, make pathways and roll (flat) the approach-routes for the machines and try to deploy them as quickly as possible, having strengthened them with date-palm planks and iron plates and paddings and having provided them with (?)gutters at the top; and position the rock-projectors and the bolt-firers, and against each of the enemy's stone-projectors counter-position two ten-mina (4.37 kg.) (ones) and a five-span (1.155 m.) (bolt-firer). (**18**) Do not make it obvious where you will make the attack; rather, feint in some places and deploy the machines in others, in order that the besieged will make mistakes in their preparations. (**19**) Ahead of the combatant-troops let wicker-tortoises be advanced, as many as possible, in order that they may readily leap out from there and engage in combat. (**20**) You yourself, especially, must be in the safest strongholds and must take special care to send out help, issuing orders as and when it is necessary and taking an overview (to see whether) something more needs to be done.

(**21**) Similarly, if <you are making the> attack from the sea, attack after putting machines on your cargo-vessels and *lemboi*; (**22**) and when you have broken through the barrier of the harbour with your largest vessels, if you possess decked warships, make the assault with the men who have most experience and are especially able to engage in combat by sea. (**23**) The breaching of the closure and the barriers is to be done either with the beaks of the ships or with the arms of the anchors, hauling (the latter) up out of the cargo-vessels you have deployed.

(**24**) When
you have brought up the machines (and) exhorted the troops and made the same proclamation as before, conduct the assault on the city from all sides, both by land and by sea, if any of the wall is sea-fronting, in order to create as much fear as possible and to split those fighting inside into many (parts). (**25**) Let all your artillery be in action, and the rams and the drills and the ravens and the assault-bridges, both

τοὺς προσήκοντας τόπους· (**26**) καὶ ποιοῦ τὴν προσ-
βολὴν ἐκ διαδοχῆς τῶν στρατιωτῶν, μηθένα
παραλιπών, ἵνα ἀκμάζοντες ἀεὶ κινδινεύσωσιν, <ὥστε>
ἰσχυρὰν ἀεὶ καὶ συνεχῆ γίνεσθαι. (**27**) Καὶ θόρυβον πο-
λὺν ποιεῖν καὶ σάλπιγγας ἀνιέσθαι κατὰ τὰ
ἰσχορότατα τῆς πόλεως, ἵνα ὑπολαμβάνοντες
ἁλίσκεσθαι ταύτῃ τὸ τεῖχος ἀπὸ τῶν μεταπυργίων
[*99*] μετὰ τῶν ἄλλων φύγωσιν, <σὺ δ'> ἐὰν περισπάσας ὡς
πλείστους τῶν ἔνδοθεν κατὰ ἅλωσιν χειρώσῃ τὴν
πόλιν. (**28**) Αὐτὸς δὲ ὅπως μὴ διακινδυνεύσῃς· οὐ-
θὲν γὰρ ἂν ἀπεργάσαιο τηλικοῦτον τῷ ἰδίῳ σώ-
ματι, ὅσον ἂν βλάψαις παθών <τι> πάντα τὰ πρά-
γματα. (**29**) Ποιητέον δ' ἐστὶν καὶ ἐμβολὰς εἰς τὰ με-
ταπύργια τῷ ἀχρειοτάτῳ τῶν μεγάλων σκα-
φῶν, ἐὰν ᾖ τόπος ἀγχιβαθὴς καὶ προβλῆτας
ἔχων κατὰ τὸ τεῖχος καὶ ταύτῃ ἀσθενὲς καὶ ἁ-
λώσιμον, ἐὰν πέσῃ.

(**30**) Δεῖ δὲ καὶ ταῖς ὑπορύξεσι τῶν τειχῶν λα-
θραίως χρᾶσθαι καθάπερ καὶ νῦν χρῶνται
<οἱ> μεταλλεύοντες· (**31**) ἐὰν δὲ ἀντιμεταλλευόντων
τῶν ἔνδοθεν συντρηθῇ ἢ εἰς λεπτὸν συνέλθῃ
τὸ ὄρυγμα, χρηστέον ἐστὶ τοῖς βουπόροις καὶ τοῖς
γαισοῖς καὶ ταῖς ζιβύναις καὶ τοῖς τρισπι-
θάμοις καταπάλταις καὶ τοῖς διμναίοις πε-
τροβόλοις· (**32**) καὶ καπνιστέον τοὺς ἐν τοῖς μετάλ-
λοις ὄντας. (**33**) Κοινὰ δέ ἐστιν ἀμφοτέρων ταῦτα καὶ
τῶν πολιορκουμένων καὶ τῶν πολιορκούντων.

(**34**) Ἵνα δὲ μὴ ἐμπίπρηται μήτε τὰ μηχανή-
ματα μήτε αἱ ἐπιβάθραι μήτε αἱ χελῶναι,
ταῖς σιδηραῖς καὶ χαλκαῖς χρηστέον ἐστὶ <λεπίσι> καὶ ταῖς μο-
λιβδαῖς κεραμίσι καὶ τῷ φύκει διερῷ εἰς
δίκτυα ἐμβαλόντα καὶ τοῖς σπόγγοις νοτεροῖς
καὶ τοῖς κωδίοις ὄξει βρέξαντα ἢ ὕδατι· (**35**) ἢ ἰξῷ
ἢ τῷ αἵματι τέφραν μίξαντα ἀλείφειν τὰ ξύ-
λα, ᾗ μάλιστα πῦρ οἴει προσπεσεῖσθαι.
(**36**) Ποιοῦνται δὲ αἱ γερροχελῶναι ἐκ τῶν
πλεχθέντων γέρρων ἄνωθεν ἐς ὀξείαν γω-
νίαν συγκλεισθέντων πρὸς ἄλληλα, ὡσαύτως δὲ
καὶ ἐκ τῶν πρόσθεν. (**37**) εἶτα βυρσῶν περιτα-
θεισῶν καὶ δοκίδων κάτωθεν μὲν ἐκ τῶν πλα-
γίων τετραγώνων συμπαγεισῶν, ἔνδοθεν δὲ
στρογγύλων ὑποτεθεισῶν οὐ χαλεπῶς ὑπὸ
τῶν στρατιωτῶν προφέρονται διὰ τὸ μηδὲ

by land and by sea, into the appropriate places; (**26**) and conduct the assault with successions of troops, exempting no-one, in order that the combatants are always vigorous – the result will be (an assault) always strong and continuous. (**27**) Also, make a great hubbub and sound trumpets at the strongest (parts) of the city, in order that (those inside), supposing that the wall is being captured there, would flee from the curtains [*99*] with the others; as for you, when you have drawn away most of those inside who are there, you may subdue the city by capture. (**28**) You yourself, though, should not participate in the combat; for nothing you might accomplish personally matches the damage you would do, to the whole operation, if you were injured at all. (**29**) Make impacts, too, into the curtains with the most unserviceable (one) of your large vessels, if the location is deep-water and has (?)inlets by the wall and is weak there and vulnerable to capture, if it falls.

(**30**) It is also necessary to employ tunnelling-operations under the walls in secret, exactly like (ore-)miners employ nowadays. (**31**) If those inside (the city) are countermining (and) the(ir) excavation is bored into or almost meets (yours), use ox-piercers and javelins and lances and three-span (0.693 m.) catapults and two-mina (873 gr.) rock-projectors; (**32**) and make smoke (to suffocate) those who are in the mines. (**33**) These (tactics) are common to both sides, the besieged and the besieging.

(**34**) In order that neither the machines nor the assault-bridges nor the tortoises are set alight, use should be made of iron and bronze <plates> and lead (?)tiles and wet seaweed (packed) into nets put on (them) and damp sponges and fleeces soaked in vinegar or water; (**35**) or (use) birdlime or mix ash with blood and daub the timbers (at the place) where you think fire is especially likely to occur.
(**36**) Wicker-tortoises are made out of plaited wicker closed together with each other at the top in an acute angle, and similarly at the front; (**37**) then, when hides have been spread over, and square screens fitted together below (rising) out of the flanks, and (?)rollers placed underneath inside, they will not be difficult for the

βάρος ἔχειν πολύ. (**38**) Αἱ δ᾽ ἐπὶ τῶν λέμβων
χελῶναι κατασκευάζονται περιφερεῖς ἄνωθεν
ἐκ σανίδων ἰσχυρῶν συμπηγνύμεναι, ὑπόφαυσιν
κάτωθεν ἔχουσαι, ὅθεν οἱ λιθοβόλοι ἀφίενται.
(**39**) Αἱ δὲ χωστρίδες τὰ μὲν ἄλλα παραπλησίως· τρο-
χοὺς δὲ ἔχουσαι καταστεγεῖς ἔμπροσθεν γίνονται,
ἵνα οἱ χωννύοντες ἐξ αὐτῶν τὰς τάφρους μὴ
τιτρώσκωνται. (**40**) Αἱ δὲ κριοφόροι οὐδέτερον ἔχουσι
τούτων ἐκ τοῦ πρὸς τοὺς ἐναντίους, ὑπότροχοι
δὲ ποιοῦνται, καὶ περιφερεῖς οὕτως ἔμπρο-
σθεν ἐνδέσεις καὶ ἀντίτονα ἔχουσαι <…

(**41**) Δεῖ δὲ> πρὸς τὰ ἐπιρριπτούμενα ἀμφίβληστρα
ἢ τοὺς κοντοὺς [τοὺς] πλαγίους παραβάλλειν
ἢ ταῖς λαμπάσιν ὑφάπτειν αὐτὰ <ἢ> [ἀντὶ τῶν ἐγ-
χειριδίων] ξιφοδρέπανα ἔχοντα ἐπικόπτειν· (**42**) ἔστι
[*100*] δὲ ταῦτα χρήσιμα καὶ πρὸς τὰς ἀναβάσεις
καὶ πρὸς τὰς τῶν σκελῶν ὑποτμήσεις. (**43**) Πρὸς
δὲ τοὺς ἀφιεμένους τροχοὺς καὶ λίθους τὰς
γερροχελώνας ὑφιέναι, πρὸς δὲ τὰ κερά-
μια καὶ τὰ κρυπτόμενα ὀρύγματα τοῖς σει-
ρομάσταις χρῆσθαι. (**44**) Πρὸς δὲ τὰς <βόθροις ἐπι>τιθεμένας
θύρας καὶ τοὺς τριβόλους τοὺς καταβαλλο-
μένους ἐνδρομίδας ἔχοντας ὑποβαίνειν καὶ
τὰς μὲν προπειράζοντας ταῖς δικέλλαις ἀνα-
σκάπτειν, τοὺς δὲ τοῖς κηπουρικοῖς κτεσὶν ἀνα-
καθαίρειν. (**45**) Πρὸς δὲ τὰς ὠρυγμένας τάφρους
ἐπιβάθρας ἐπιβάλλειν. (**46**) Πρὸς δὲ τοὺς προ-
βαλλομένους λίθους χεῖρας σιδῆρας ἐπιρρι-
πτοῦντας ὀνεύειν. (**47**) Πρὸς δὲ τοὺς κατακρημνω-
μένους τριβόλους καὶ δοκίδας καὶ τοὺς προ-
τιθεμένους φορμοὺς τοῖς δρεπάνοις χρῆσθαι.
(**48**) Πρὸς δὲ τοὺς κριοὺς καὶ τὰ τρύπανα καὶ τοὺς
κόρακας τοῖς ἐνετῆρσι καὶ ταῖς κεραίαις καὶ
τοῖς περιβαλλομένοις βρόχοις καὶ τοῖς λοιποῖς
κρίκοις. (**49**) Πρὸς δὲ τοὺς πυροφόρους καὶ τοὺς τρι-
βόλους τοὺς καιομένους καὶ τὰς λαμπάδας
καὶ τὰς ἀνθυπορύξεις τοῖς εἰρημένοις. (**50**) Τὰς δὲ
παλιούρους σκάπτοντας εἰς <τὸ> τὰ τέλματα κατα-
χωννύναι, τὰς δ<ὲ χαρακώσεις> ἐκκόπτοντας εἰς τὰς ἐγχώσεις τῶν
τάφρων καταχρῆσθαι. (**51**) Πρὸς δὲ τὰς τῶν πετροβό-
λων εἰς τὰς στοὰς γινομένας πληγὰς πρὸς
μὲν τὰς ἄνωθεν ἐπιβάλλειν γέρρα τριπλᾶ καὶ
ἐπ᾽ αὐτὰ φόρμους ἐμπιπλῶντα ἀχύρων ἢ
φύκους, πρὸς δὲ τὰς ἐκ τῶν πλαγίων προσ-

troops to carry because their weight will not be great. (**38**) The tortoises on the *lemboi* are made rounded above, assembled out of strong planks, and have an aperture, below, from which stone-projectors fire. (**39**) Filler(-tortoise)s (are constructed) similarly in most respects but they have wheels and are roofed in front, in order that the men filling the trenches from them are not wounded. (**40**) Ram-carrying ones have neither of these (features) in the (part) facing the enemy, but they are made with wheels underneath, and they have rounded fastenings at the front, thus, and (?)guy-ropes <for …>.

(**41**) <… It is necessary>, against wrappings that are being thrown on, either to thrust out poles sideways or to set them on fire from below with torches or to trim them off (using tools) which have sword-scythes; (**42**) these (last) are [*100*] also useful (to the defenders) against ascents and for hacking at the legs (of the climbers) from below. (**43**) Against wheels and stones being released, put in wicker-tortoises, but against pots and concealed excavations use probes. (**44**) Against doors that are being laid <over pits> and (against) *triboloi* that are being thrown down, men wearing boots (must) go in: the former they test for in advance with mattocks and dig up; the latter they clear with gardening rakes. (**45**) Against trenches that have been dug, impose assault-bridges. (**46**) Against stones that are being hurled forwards, grip them with "iron hands" and winch them (away). (**47**) Against suspended *triboloi* and (?)screens and thrust-out baskets, use scythes. (**48**) Against rams and drills and ravens (the defenders should use) blowers and cranes and nooses thrown around (them) and the rest of the rings. (**49**) Against incendiaries and burning *triboloi* and torches and counter-tunnelling operations, use the (tactics) mentioned. (**50**) The thorn-hedges should be dug (up) for piling into <the> ponds, and the <palisadings> cut out and used for the fillings-in of the trenches. (**51**) Against the blows of rock-projectors received by stoas: against the ones (striking) against the top, put on three layers of wicker and, on these, baskets filled full of chaff or seaweed; against the

χωννύναι τοὺς τοίχους ἄχρι τῶν γέρρων, πρὸς
δὲ τὰς ἄλλας πάσας τοῖς μαλάγμασι χρῆ-
σθαι. (**52**) Πρὸς δὲ τὰ ἐνιέμενα ὕδατα ἐξαγω-
γίδας ὀρύσσειν. (**53**) Πρὸς δὲ τὰς ἀποτμήσεις τῶν
ἀγκυρίων ἐὰν βαθὺς ὁ τόπος, ἀλύσεις, ἐὰν δὲ
τεναγώδης, τὰς ἀγκύρας τῶν πλοίων χῶναι κα-
θέξουσιν. (**54**) Πρὸς δὲ τὰς ἐκτρυπήσεις τῶν νεῶν
κύκλῳ φύλακας καταλειπτέον καὶ τὰς σα-
νίδας παρορμιστέον, ἐξ ὧν ἔχοντας τριόδον-
τας τηρεῖν τοὺς ὑποδενδρυάζοντας. (**55**) Πρὸς δὲ
τὰς ὑποχώσεις καὶ τὰς ἐν τῇ γῇ γινομένας
ἀνακαθάρσεις τῶν πιπτόντων λίθων ἀπὸ τῶν
τοίχων καὶ τῶν προτειχισμάτων χρήσιμά ἐστιν ἐκ μὲν
θαλάσσης <τὰ ἀντλητήρια> οἷς ἀνακαθαίρουσι τοὺς λιμένας
καὶ σιδηραῖ ἁρπάγαι· (**56**) ἐκ γῆς δέ, ὅταν ὑποτάξω-
σι πρὸς τὰ πτώματα, αἱ χωστρίδες χελῶναι
καὶ οἱ μοχλοὶ καὶ αἱ δίκελλαι καὶ αἱ ἅμαξαι.

(**57**) Ἐὰν δέ τινος τῶν μηχανημάτων ἡ πρὸς
τοὺς πολεμίους καθήκουσα πλευρὰ πέσῃ, στρέ-
ψαντας δεῖ πρὸς τοὺς ἐναντίους τὴν ὑγιῆ
τὴν τετριμμένην ἐπισκευάζειν. (**58**) Πρὸς δὲ τὰ
ἄλλα συμπτώματα ἐκ τούτων αὐτῶν δεῖ ἐν-
[101] θυμουμένους αἰεί τι μηχανᾶσθαι μὴ ἀνοή-
τως.

(**59**) Καὶ ἐὰν μὲν πολὺν χρόνον μέλλῃς πο-
λορκεῖν τὴν πόλιν, δόξαν ἐμποίει τοῖς πολε-
μίοις ὡς ὀλίγον χρόνον πολιορκήσων, ἵνα δα-
ψιλῶς ἀναλίσκωσι τὰ πρὸς τὴν τροφὴν ἀνή-
κοντα καὶ μὴ παρασκευάζωνται πρὸς τὰς ἐσο-
μένας προσβολὰς μηδὲ βοήθειαν μεταπέμ-
πωνται· (**60**) ἐὰν δὲ πολιορκῇς, ὡς πολὺν χρόνον
προσκαρτερήσων ἀπείλει, ἵνα φοβηθέντες τὸ
μέλλον θᾶττον ἡμῖν συγχωρήσωσιν ὃ βουλόμε-
θα.

(**61**) Πειρῶ δὲ καὶ τὴν ἔνδον οὖσαν λείαν <καὶ> ἐὰν
ὑποζύγιά τινα ᾖ, παρελέθαι, ἢ ἐξαγοράσαι
ὡς ἐλαχίστου μάλιστα δύνῃ, ἢ ἐν ταῖς γινο-
μέναις ἀνοχαῖς πρόφασίν τινα λαβὼν πιθα-
νὴν μηκέτι εἰσελάσαι ἄφες μὴ φυ-
λάσσων τοὺς τόπους τούτων ἢ ἐξελαύνοντες
βοσκήσουσιν, ἀλλ᾽ ἔασον αὐτοὺς ἔξω νέμειν καὶ
ἔπει<τ᾽ ἐπιδραμὼν> [τὴν ἐνέδραν] ἢ ἐνέδραν κατασκευάσας
ἀποτεμόμενος κυρίευσον αὐτῶν.

(blows coming in) from the flanks, heap earth against the (stoas') sides as far as the wicker; against all others, use paddings. (**52**) Against waters that are being directed in, dig drainage-channels. (**53**) Against the anchor-cables being cut off: in deep water chains, in shallow water funnels, will hold fast the anchors of the vessels. (**54**) Against the ships being drilled-out, they need to be encircled with guards and moored beside planks, from which (men) with tridents keep a lookout for those lurking under water. (**55**) (Methods) useful against under(water) mounds and, on land, (for) clearances of stones falling from the walls and the outworks are: out of the sea, <the scoops> with which harbours are cleared, and iron grapnels; (**56**) but out of the land, when they assign (personnel) to the debris, filler tortoises and crowbars and mattocks and wagons.

(**57**) Should the face (turned) toward the enemy fall off any of your machines, it is necessary to turn the sound one toward the opponents and attend to the damaged one. (**58**) Against other misfortunes it is necessary, by *[101]* cogitating on the basis of these same things, always to contrive something intelligently.

(**59**) And if your intention is to besiege the city for a long time, give the enemy an impression that you will be besieging them for a short time, in order that they may liberally consume the commodities earmarked for provisioning and may not be prepared for the assaults to come, or send for help; (**60**) but if you are besieging (aggressively), threaten to persevere for a long time, in order that, fearful of the future, they may concede to us sooner what we want.

(**61**) Try, too, to remove the livestock that is inside (the city) <and> any draught-animals there may be. Either buy them up as cheaply as you possibly can or, seizing some plausible pretext in the truces which occur, let (the enemy) no longer (have to) drive in (the beasts) – by not guarding the places where they drive them out to pasture; rather, allow them outside grazing and then rush in or lay an ambush to cut them off and take control of them. (**62**) For (the

(62) Οὐθὲν γὰρ ἀναλίσκει τῶν ἐν τῇ πολιορκίᾳ χρησίμων ὄντων, ἀλλ᾽ ἢ ἄχυρον ἢ χόρτον, οἷς εἰς οὐθὲν ἄλλο, εἰς δὲ τὰ βοσκήματα χρῶνται· (63) πρὸς ὑγίειαν δὲ καὶ τροφὴν μεγάλα συμβάλλεται διά τε τοῦ γάλακτος καὶ κατακοπέντων καὶ πωλουμένων τῶν κρεῶν· (64) ἔτι δὲ τὰ δέρματα αὐτῶν πρὸς τὰ μηχανήματα καὶ τοὺς κριοὺς καὶ ὅσα ἐστὶ τοιαῦτα χρήσιμα γίνεται.

(65) Μὴ φείδου δὲ χρημάτων μήτε κατὰ δωροδοκίαν μήτε κατὰ τὰς ἄλλας δαπάνας· ἑλὼν γὰρ τὴν πόλιν πολλαπλάσια λήψῃ.

(66) Καρβάτιναι δέ σοι οἰκίαι <παρασκευαστέαι> καὶ ἐκ τῶν καρβατίνων βάλλοντες καὶ οἱ λιθοβόλοι καὶ οἱ τοξόται καὶ οἱ σφενδονῆται ὡς πλεῖστοι καὶ ἄριστοι κατὰ τὰς προσβολὰς ἔστωσαν ἐνεργοῦντες, ἵνα <μὴ> τραυματίζωνται· (67) διοίσει γὰρ οὐδὲν ἢ τελευτᾶν ἢ ἀχρείους γίνεσθαι τοὺς κινδυνεύοντας. (68) Καὶ αὐτὸς ἐκτὸς βέλους ὢν ἢ ἀσφαλῶς παραπορευόμενος παρακάλει τοὺς στρατιώτας καὶ τοὺς μὲν ἀγαθοὺς γινομένους ἄνδρας ἐπαίνει τε καὶ τίμα, τοὺς δὲ κακοὺς λοιδόρει τε καὶ κόλαζε· (69) οὕτως γὰρ ἂν ἄριστα κινδυνεύσειαν οἱ στρατιῶται πάντες.

(70) Ἁλισκομένης δὲ τῆς πόλεως φοβοῦ μὴ εἰς διαρπαγὴν ὁρμήσαντες οἱ στρατιῶται αὐτοί τε ὑφ᾽ ἑαυτῶν καὶ ὑπὸ τῶν ἐναντίων παραπόλωνται ἢ πάλιν ἐκβληθῶσιν ἐκ τῆς πόλεως ἢ κατασχόντες αὑτοῖς δυσμενεῖς καὶ ἀχρείους πρὸς τὰς λειτουργίας καὶ τὰς εἰσφορὰς ποιήσωσι τοὺς πολίτας καὶ γένηται μάταιος ὁ πόνος διαρπασθέντων τῶν χρημάτων καὶ μίσος ποιησάμενος μήτε τὰς σιταρχίας ἔχῃς ἀναδιδόναι τοῖς στρατιώταις [*102*] μήτε ὠφέλεια μηδ᾽ ἥτις οὖν σοι γένηται τούτου συμβαίνοντος.

(71) Καταλαμβάνειν δ᾽ ἐν ταῖς ἁλώσεσι μάλιστα δεῖ τὰ τείχη καὶ τὴν ἀκρόπολιν καὶ τὴν ἀγορὰν καὶ τὸ στρατήγιον καὶ ἐάν τις ᾖ ἄλλος τόπος ἰσχυρός· ἐὰν δὲ ἐλάττων ᾖ ἡ δύναμις, [εἰς] τοὺς πύργους καὶ τὸν ἐπικαιρότατον τόπον, ἵνα μὴ πάλιν ἐκπέσῃ τῆς πόλεως.

livestock) consumes nothing of what is useful in the siege, apart from chaff or hay, which serves no other purpose than fodder; **(63)** and it makes great contributions to health and nourishment because of both the milk and, when it is cut up and sold, the meat; **(64)** what is more, the skins are useful for the machines and the rams and suchlike.

(65) Do not skimp on money, whether in bribery or in other expenses; once you have taken the city you may recoup many times as much.

(66) Leather-hide houses <should be made ready> for you, and from out of the leather-hides stone-throwers and archers and slingers do their firing, as many and as good as possible, stationed there to be active during the assaults – (this) in order that they are <not> wounded; **(67)** for whether the combatants die or (merely) become unserviceable will make no difference. **(68)** And you yourself, staying out of range or passing along the line in safety, must exhort the troops: praise and reward the men who show bravery, but revile and punish the bad ones; **(69)** for that is how all the troops will fight best.

(70) While the city is being captured, be fearful in case the troops rush into plundering and are killed, both by each other and by the opponents, or are expelled from the city again, or by seizing (items) for themselves make the citizens hostile and unfit for (contributing) services and levies, and the effort (of trying to impose them) is wasted because their possessions have been plundered; and after creating hatred you have neither food-allowances to give out to the troops [*102*] nor, if this happens, is there any advantage for yourself.

(71) During captures it is particularly necessary to gain possession of the walls and the acropolis and the agora and the generals' office and any other strong place there may be; if (your) force is less (than is needed to do so, at least gain possession of) the towers and the most important place, in order that you are not expelled from the city again.

(72) Ἐὰν δὲ μὴ δύνῃ πολιορκῶν κατὰ κράτος λαβεῖν τὴν πόλιν διὰ τὸ ἰσχυρὰν εἶναι αὐτὴν πάντοθεν, ἐπιχειρητέον ἢ κατὰ <κλοπὴν ἢ> προδοσίαν ἢ λιμὸν αὐτὴν ἑλεῖν.

(73) Κατὰ κλοπὴν μὲν νυκτὸς ἢ τὰς σκυτίνας κλίμακας προσθέντας, αἳ ῥάπτονται καθάπερ οἱ ἀσκοὶ καὶ ὑπαλοιφῇ κατὰ τὰς ῥαφὰς ὑποστεγνωθεῖσαι φυσῶνται, εἶτα προστιθέντα ἐπὶ ταῖς στυπίναις κλίμαξιν αἳ κατασκευάζονται διὰ πλοκῆς καὶ ῥαφῆς, καὶ πρὸς τὰ πέρατα αὐτῶν ἄγκιστρα προσάπτοντα, ἵνα ἐπιρριπτουμένων τῶν ἄκρων ἐπιλαμβάνηται τῶν προμαχώνων· (74) ἢ τοῖς σιδηροῖς πασσάλοις, οἳ στομωθέντες καὶ ὀξυνθέντες καὶ εἰς τὰς πέτρας κατὰ τὰς διαφύσεις καὶ εἰς τοὺς λιθίνους τοίχους κατὰ τὰς συμβολὰς καὶ εἰς τοὺς πλινθίνους ἐγκόπτονται σιδηραῖς σφύραις ὑπὸ τῶν ἀναβαινόντων· (75) <ἢ> τοῖς ἀγκίστροις τοῖς σιδηροῖς, ἅπερ ἐπὶ καλῳδίων <πρὸς τὰς ἐπάλξεις> ἐπιρριπτοῦνται ἄμματα ἐχόντων, ὥστε μὴ χαλεπῶς καὶ κατὰ ταῦτα ἔχειν ἀναβαίνειν τοὺς στρατιώτας ἐθισθέντας, καθάπερ Αἰγύπτιοι ποιοῦσιν αὐτό.

(76) Κατὰ δὲ [τὴν] προδοσίαν ἢ μεταπεμψάμενός τινα τῶν ἔνδοθεν ὡς διαλεξόμενον περὶ διαλλαγῶν ἢ δι᾽ ἐπιστολῶν ἀφανῶν κήρυκας ἢ πρεσβευτὰς εἰσπέμπων καὶ σύμβολα διδοὺς καὶ χρήματα. (77) Γράφονται δ᾽ αἱ ἐπιστολαὶ εἰς καυσίαν καινὴν <ἢ> εἰς τὸν χρῶτα κηκῖδος θλασθείσης καὶ ὕδατι βραχείσης· ξηρανθέντα δὲ τὰ γράμματα ἄδηλα γίνεται, χαλκοῦ δὲ ἄνθους τριφθέντος ὥσπερ ἐν ὕδατι τὸ μέλαν καὶ ἐν τούτῳ σπόγγου βραχέντος, ὅταν ἀποσπογγισθῇ τούτῳ, φανερὰ γίνεται· (78) ἢ εἰς ὑμένα γραφείσης, εἶτα διπλῆς οὔσης τῆς καυσίας εἰς τὸ ἀνὰ μέσον τεθείσης τῆς στεφάνης καὶ ἑτέρας <ἐπι>κολληθείσης· (79) ἢ ἀνὰ μέσον τῶν ὑποδημάτων τοῦ ἐμβλήματος καὶ τοῦ κασσύματος ῥαφείσης· (80) ἢ εἰς κύστιν ὧν βούλεταί <τις> γραφέντων, εἶτα εἰς λήκυθον καινὴν σύμμετρον τῇ κύστει τεθείσης, εἶτα βρεχθείσης καὶ μετὰ ταῦτα φυσηθείσης καὶ ὑποσταλείσης <…> πρὸς τὸ ἔσω στόμα κόλλῃ καταλειφθέντος καὶ ἐλαίου ἐγχυθέντος, ἵν᾽ ἄδηλος ἡ ἐπιστολὴ γένηται, τοῦτον τὸν τρόπον εἰσπέμπειν· (81) ὁ γὰρ λαβὼν τὴν λήκυθον [τρόπον εἰσπέμπειν] ῥᾳδίως γνώσεται τὰ γεγραμμένα. (82) Πολλοὶ δὲ καὶ ἄλλοι τρόποι εἰσὶ τῶν κρυφαίως ἀποστελλομένων γραμμάτων, ὡς δηλώσομεν ἐν τῷ εἴδει τῷ περὶ ἐπιστολῶν τῶν κρυφαίως ἀπο-



(72) If in your siege you cannot take the city by force because of its being strong (when approached) from every side, an attempt should be made to take it either by <stealth or> treachery or starvation.

(73) By stealth, at night. Either apply leather ladders, (the components of) which are sewn just like wineskins and made airtight with grease at the seams and inflated; then attach to oakum ladders, which are constructed by plaiting and stitching, and fasten hooks to their extremities, in order that when the ends are thrown on (to the wall) they catch on the battlements. (74) Or (use) iron pegs which have been tempered and sharpened: they are knocked by the men climbing up, with iron hammers, into rocks where the cracks are and into stone walls where the joints are and into brick (walls). (75) Alternatively, (use) iron hooks which are thrown <onto the parapets> on cords which have (the sort of) loops that create no difficulty for habituated soldiers to climb up by, just as the Egyptians do it.

(76) By treachery. Either (go about this) by sending for one of the men inside, as (if?) to have a discussion about terms (of surrender), or by means of unseen messages, sending in heralds or envoys and giving (them) recognition-tokens and money. (77) The messages are written upon a new hat <or> upon the skin, with oak-gall crushed and soaked in water; once the letters have dried they become invisible, but when flower of copper has been pounded, just like black (colouring) in water, and a sponge has been soaked in this, they become visible. (78) Alternatively (it can be) written onto a (?)membrane which is then placed in the upper part of a double hat, (i.e.) with (one) brim glued onto another; (79) or sewn in the middle of shoes, between the insole and the sole; (80) or what one wishes (to say can be) written on a bladder, which is then placed in a new flask commensurate with the bladder, then soaked and afterwards inflated and shrunk <…> attached with glue to the inside mouth and oil poured in, in order that the message becomes invisible. Send it in (to the city prepared) in this way; (81) the man who receives the flask will easily discern what has been written. (82) There are many other ways, too, of despatching letters secretly, as we will show in the (?)section about messages being sent

στελλομένων. **(83)** Ἐὰν δὲ μὴ καθαιρεθῶσιν ὑπὸ τῶν οὕτως
πεμπομένων γραμμάτων, ἄλλας πέμπε πρὸς τοὺς
[*103*] ἡγουμένους τῶν πραγμάτων ὑπισχνούμενος
δωρεὰς μεγίστας καὶ χρήματα· αἵ καταφανεῖς
γινόμεναι τοὺς μὲν στασιάζειν ποιήσουσιν <…>.

(84) Κατὰ δὲ λιμὸν περιχαρακώσας καὶ τόπον ἰσχυ-
ρὸν περιτειχίσας τινὰ τῇ πόλει καὶ φύλακας ἀ-
σφαλεῖς ἐπ᾽ αὐτῷ κατασκευάσας, οἳ κωλύσουσι
μήτε κατὰ γῆν μήτε κατὰ θάλασσαν μηδὲν εἰσ-
κομίζεσθαι. **(85)** Ταῦτα δὲ ποιήσας γίνου πρὸς τοῖς
ἄλλοις πράγμασι καὶ λήψῃ τὴν πόλιν ἢ τῷ
πολέμῳ κατορθώσας ἢ ἐκθλίψας λιμῷ, καὶ
οὐθὲν καθυστερήσεις τῶν πράξεων.

(86) Ἐὰν δὲ βοήθειάν τινα προσδέχῃ παρασκευά-
σασθαι τοῖς ἐναντίοις, ἐὰν μὲν καταδεεστέραν
δύναμιν ἔχῃς, διάλυσαι τὴν ταχίστην ἐὰν βού-
λωνται χρήματα λαβὼν ὡς ὅτι πλεῖστα ἀναζευ-
γνύων πρὸς τὸ πλησιάσαι τοὺς πολεμίους· **(87)** ἐὰν δὲ
μὴ διδῶσιν, λελατήσας καὶ κακώσας τὴν χώραν αὐ-
τῶν ἀπαλλάττου πρόνοιαν ποιούμενος, ὅπως
ἀσφαλῶς ἀπάξεις τὸ στρατόπεδον. **(88)** Ἐὰν δὲ παρα-
πλησίαν ἢ κρείττω δύναμιν ἔχῃς καὶ κατὰ γῆν
προσδέχῃ τοὺς πολεμίους, τῇ χαρακώσει καὶ τῇ τάφρῳ καὶ τῇ
τειχοποιίᾳ πάντοθεν ὡς ἀσφαλέστατα
παρασκευασάμενος ὑπόμενε, τὴν χρείαν καὶ τὸν
χόρτον καὶ τὸν σῖτον καὶ τὸν οἶνον καὶ ὅσα ἄλλα τροφῆς ἐστιν ἐχό-
μενα πρὸς τὸ στρατόπεδον προσαγόμενος· **(89)** καὶ
τάφρῳ καὶ χάρακι περιβαλὼν αὐτὸ τὰ μὲν ἱκα-
νὰ κατάλειπε, τὰ δὲ ἀπόδου, τὰ δὲ ἄλλα τοῖς
στρατιώταις εἰς τὰ τάγματα διάδος. **(90)** Τὸν δὲ κατά-
λοιπον χόρτον καὶ σῖτον ὅσον ἂν μὴ δύνῃ προσ-
κομίσαι, <τὸν μὲν χόρτον> κατάκαυσον· **(91)** τὸν δὲ σῖτον διάφθειρον τοῖς
θανασίμοις φαρμάκοις, ὡσαύτως δὲ καὶ τὰ ὕ-
δατα, ὅταν ἐγγίσωσιν οἱ πολέμιοι· **(92)** τίνα δὲ ταῦτά
ἐστιν, ἐν τοῖς Παρασκευαστικοῖς ἡμῖν δεδήλωται.
(93) Διαπραξάμενος δὲ ταῦτα ὡς ἰσχυροτάτους φύ-
λακας κατάστησον· **(94)** καὶ τῆς μὲν νυκτὸς ἐκκοιτίαι
γινέσθωσαν, τῆς δ᾽ ἡμέρας σκόπει ἐν τοῖς
ἐπιτηδείοις τόποις· **(95)** καὶ κατασκόπους ἀπόστελλε
βελτίστους καὶ ἔμφρονας, ἵνα μὴ λάθωσι παρελ-
θόντες τινὲς <τὸ> τῶν ἐναντίων πλῆθος ἐγγίσαν. **(96)** Καὶ
πειρῶ πρῶτον τοὺς στρατηγοὺς ἢ τοὺς ἡγεμόνας
φθεῖραι χρήματα διδοὺς καὶ δωρεὰς ὑπισχνού-

secretly. **(83)** Should (the cities) not be brought down by letters being sent thus, send others to the [*103*] leading men of affairs, promising them great rewards and money; when they come to light they will make some people seditious <…>.

(84) By starvation. Surround (the city) with a palisade and fortify some strong place (next) to the city and establish (there) reliable guards, who will prevent anything being brought in, whether by land or by sea. **(85)** When you have done this, turn to other matters and you should take the city either after military success or after squeezing it out by starvation, and you will not fall short at all in your endeavours.

(86) (What to do) if you expect that some reinforcements have been prepared for your opponents. If your force is weaker, come to terms as quickly as possible, if they are willing, taking as much money as you can (and) breaking camp in the face of the approaching enemy; **(87)** if they do not offer (terms), withdraw after pillaging and maltreating their territory, giving thought to moving the army away securely. **(88)** If on the other hand your force is comparable or superior and you are expecting the enemy (to be augmented) by land, make the most secure preparations you can, overall, with the palisading and the trench and the fortification-system and stand firm. (Do this by) bringing to the camp essentials and fodder and grain and wine and other available foodstuffs; **(89)** and when you have encircled it with a trench and a palisade, keep back enough (of these commodities), sell some, and distribute the rest to the troops, by formations. **(90)** As regards the fodder and grain left over, what you may not be able to bring in (to camp): burn up <the fodder>; **(91)** but destroy the grain with lethal potions, in just the same way as (you poison) the waters, when the enemy approach; **(92)** what these (methods) are has been shown in our *Preparations*. **(93)** When you have accomplished this, post your strongest men as guards; **(94)** and let there be night-watches at night, and by day keep a lookout in the appropriate places; **(95)** and send out your best and (most) intelligent men as observers, in order that individuals arriving sooner than the mass of the opponents which has approached do not escape notice. **(96)** Try too, at the outset, to corrupt the (enemy) generals or commanders by giving money and promising rewards:

μενος· (**97**) οὕτως γὰρ ἐὰν κρίνῃ, γίνεται νικᾶν καὶ
οὐδέν ἐστιν ἕτερον στρατήγημα τοιοῦτον· (**98**) καὶ τὰ
χρήματα ἐκ τῶν πολιορκουμένων ἔσται τῆς πό-
λεως ληφθείσης. (**99**) Ἐὰν δὲ μὴ δύνῃ δεκάσαι τοὺς ἡ-
γουμένους τοῦ στρατοπέδου, ἐνέδρας κατασκευά-
σας ἢ τόπους ἐπιτηδείους προκαταλαβόμενος ἐπί-
θου καταστρατοπεδεύουσιν αὐτοῖς νυκτὸς πρὸ τοῦ <δίδοσθαι>
τάφρου ἐπιλαβέσθαι, <ἢ> χάρακα θέσθαι τοῖς βοη-
θοῦσιν· (**100**) οὗτοι γὰρ οἱ καιροὶ τοὺς ἀντιπάλους
χειροῦνται.

[*104*] (**101**) Ἐὰν δὲ κατὰ θάλασσαν μέλλῃς διακινδυνεύειν,
χῶσον ἐὰν ᾖ δυνατὸν τὸ στόμα τοῦ λιμένος· εἰ
δὲ μή, φράξον ταῖς ὁλκάσιν <ἢ> ὅσοις ἂν ἔχῃς ἐπι-
τηδείοις πρὸς ταῦτα πλοίοις, καὶ παράζευξον
σχεδίαν ἐκ τῶν ὑπαρχόντων ξύλων κατα-
σκευάσας. (**102**) Καὶ τήρει τοὺς φρυκτοὺς μάλιστα τῆς
νυκτός, μή σε λάθωσιν οἱ βοηθοῦντες κατὰ τὸ
ἐκτὸς τῆς θαλάσσης μέρος τῆς πόλεως παρεμ-
πεσόντες. (**103**) Ἐὰν δὲ τύχῃς ἔχων μικρῷ καταδεεστέ-
ραν δύναμιν ναυτικήν, ἐπὶ τὰ καταστρώματα
λαβόντα τοὺς ἀρίστους καὶ ἐμπειροτάτους τῶν στρα-
τιώτων, παρεγγείλαντα μήτε ἀκρωτηριάζειν
μήτε ἀναβαίνειν ἐπὶ πολεμίαν ναῦν μηδεμίαν,
ἀλλὰ τῷ χαλκώματι χρᾶσθαι, ναυμαχητέον
ἐστὶ πρὸς αὐτούς, ποιήσαντα μηνοειδὲς σχῆμα
καὶ τὰς ἐπίπλους καὶ τὰς εὐπροσόδους καὶ τὰς
ἄριστα πλεούσας τῶν νεῶν ἐπὶ τὰ κέρατα τά-
ξαντα, τὰ δὲ ἄφρακτα καὶ τὰ ὑπηρετικὰ εἰς
μέσον πρὸς τῇ σχεδίᾳ. (**104**) Εἶθ᾽ ὅταν ἐγγίσωσι, τοῖς
πυροφόροις καὶ τοῖς ἡμμένοις τριβόλοις καὶ ταῖς λαμπάσι καὶ τῇ
πίσσῃ ἅπτε ἐὰν ἔχῃς· (**105**) καὶ τοῖς λιθοβόλοις
καὶ τοῖς ὀξυβελέσι καὶ τοῖς ἄλλοις βέλεσιν ὡς πλεί-
στοις χρώμενον κακοῦν δεῖ τοὺς ἐπιβάτας καὶ
συντρίβειν καὶ ἐμπιπράναι τὰ τῶν ἐναν-
τίων σκάφη τύπτοντα ἐκ τῆς γῆς καὶ ἀπὸ τῶν
μηχανημάτων καὶ ἀπὸ τῶν ἄλλων πλοίων, κα-
ταρράξαντα αὐτοὺς ὡς μάλιστα, ἐὰν τί που
βιάζωνται. (**106**) Ἐὰν δὲ ὑπομένωσιν, ἔξω τὸν κίν-
δυνον ἀπὸ ἀμφοτέρων ποιούμενον τῶν κερά-
των συναγαγόντα. (**107**) Ναυμαχητέον οὕτως ἐστίν· τὰς
μὲν πλαγίας λαμβάνων καταδύσεις, τὰς δὲ ἀν-
τιπρώρους κινδυνεύσας συντρίψεις καὶ ἐμ-
πρήσεις, καθάπερ εἴρηται· (**108**) ἐὰν δὲ λάβῃς ἀτά-
κτως φερομένας ἢ ἱστιοδρομούσας, ἐπιπλεύσας

(**97**) for if you decide (to act) thus, victory can occur and there is no other stratagem like it; (**98**) and the money will be (recoverable) from the besieged once the city has been taken. (**99**) If you are not able to bribe those who are in command of the (reinforcing) army, prepare ambushes or capture suitable places in advance and make a night attack on them while they are pitching camp, before <an opportunity is given> to the reinforcing (troops) to put in a trench <or> to position a palisade; (**100**) for these are the circumstances in which one's adversaries come off worse.

[*104*] (**101**) If, though, you are likely to be engaging in combat (with reinforcements who arrive) by sea, fill in the mouth of the harbour, if it is possible; if not, close it with your cargo-vessels <or> whatever boats you may have that are suitable for this, and lash together a raft which you have prepared out of available timbers. (**102**) Also keep particular watch on the beacons at night, in case the reinforcers surprise you by mounting an attack on the seaward part of the city. (**103**) Should you happen to have a naval force only slightly inferior (to theirs), put on the decks the best and most experienced of your troops, and give orders forbidding (?)using the stern-post or boarding an enemy warship; instead, (allow only) the use of the bronze (ram). A sea-battle should be fought against them when you have formed (your fleet into) a crescent shape and have drawn up the attacking and most manoeuvrable and best-sailing of your ships on the wings, with the undecked and support vessels in the centre by the raft. (**104**) Then when (the enemy ships) come close, set them alight with incendiaries and flaming *triboloi* and torches and pitch, if you have (them); (**105**) it is also necessary to use stone-projectors and bolt-firers and other artillery, as many as possible, to maltreat the(ir) marines and to crush and burn the enemies' craft by striking them (with projectiles fired) out of the land(ward side) – from the machines – and from the other boats; shatter them as best you can, if they come in force at any point. (**106**) If they bide their time, (you must) bring together (your forces) from both wings and conduct the combat outside (the immediate vicinity?). (**107**) This is how to fight a sea-battle: you will sink some (of their ships) by taking them from the side; others, faced head-on, you will crush and burn, just as has been stated. (**108**) If you encounter any that are out of position or pro-

ἐν τάξει παντὶ τῷ στόλῳ τὰς μὲν ἀμυνομένας
πειρῶ καταδύνειν καὶ καταπιμπράναι· (**109**) τὰς δὲ
φευγούσας ὅταν καταλαμβάνῃς, τὰ πηδάλια
συντρίβων καὶ τὸν ταρσὸν παρασύρων εἰς τὴν γῆν
κάταγε.

(**110**) Ἐὰν δὲ μὴ ἔχῃς ναῦς, τῷ πυρὶ καὶ τοῖς
βέλεσι χρώμενος κώλυε αὐτοὺς <ἀπάλλαξιν> ποιήσασθαι.

(**111**) Τοῦ-
τον ἄν τις τὸν τρόπον πολιορκῶν τὰς πόλεις
ἂν λαμβάνοι μάλιστα μηθὲν αὐτὸς ἀνήκεστον παθών.

ceeding under full sail, attack in formation (and) in full force: those that are putting up a defence, try to sink and to burn down; (**109**) as regards those that are fleeing when you catch them, crush (in each case) the rudders and snap off the oarage and bring (the vessel) into land.

(**110**) Should you not have warships, prevent them by the use of fire and projectiles from making <an escape>.

(**111**) Anyone besieging cities in this way is especially likely to capture them while suffering nothing ruinous himself.

COMMENTARY

PART A: FORTIFICATION(S)

As regards walls, Megillos, I myself would concur with Sparta that walls should be left slumbering in the ground and not disturbed. These are my reasons. For one thing, in that fine poetic phrase on the subject so much quoted, "walls should be of bronze and iron, not dug from the earth"; and besides, we would become a great joke, and rightly so, if every year we sent out our young men into the countryside, to dig holes and trenches and to thwart the enemy with various building-projects designed, of course, to stop them crossing the boundaries of our territory – only to build a circuit-wall. That is something which, first, is never advantageous to the health of cities, and is anyway apt to create a certain softness of spirit in the inhabitants. It invites them to flee to it for refuge rather than warding off the enemy, or even ensuring their safety by mounting guard in the city night and day, and to suppose that they will truly acquire the means of safety from being barricaded in by walls and gates and dozing off, as if born to be spared toil. They do not realize that it is out of toils that comfort truly comes, whereas out of *disgraceful* comfort and laziness, I believe, are born only toils renewed.

(Plato, *Laws* 6.778D-779A; cf. 760A-761A for the defence of the *chôra* alluded to)

As regards walls, those who assert that cities which lay claim to valour should not have them are taking too old-fashioned a view, despite being able to see that the cities which preened themselves in that way are being refuted by reality. Admittedly, when facing enemies of the same kind and not much greater in number it is not honourable to attempt to stay safe through the strengthening of one's walls; but since there can be circumstances in which the superiority of the attackers may be too much for the human valour of a few men, what must be realized – if the necessity is survival and the avoidance of defeat and humiliation – is that the most secure strengthening of the walls is the most warlike, especially given the inventions that have now been made in the precision of artillery and (other) machines used in sieges. To think it right not to surround cities with walls is like aiming for a territory easy to invade and removing its mountainous places, as well as not surrounding even private houses with walls on the basis that the inhabitants will be cowardly. Another point not to be overlooked is that those who have surrounded their city with walls have the option of using cities in both ways, as cities both with walls and without, whereas that is not a possibility for ones which do not have them. If this is the situation, not only must surrounding walls be built but attention must be paid to them, both in order that the city may be adorned suitably and as regards military requirements, especially the inventions now made. For just as attackers pay attention to the means by which they will gain advantage, so the things that those defending themselves can do have in some instances been invented already but others must be sought and thought about. An enemy does not even start trying to attack those who are well prepared.

(Aristotle, *Politics* 7.1330b32–1331a18)

A century after this celebrated exchange, Ph., needless to say, would have endorsed the latter, Aristotelian position. What is more, the full, original version of his part A laid out (we can fairly suppose) a more or less lavish set of recommendations for anyone in this later era who shared that all-but-irrefutable view and wished to see what its practical implications would or might be for every aspect of *teichopoiia*, from its individual, tactical elements – the design and construction of towers, curtains, gates, etc. – through trenching and other outworks to a strategic approach to

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the matching of particular wall-traces to the type(s) of terrain best suited to them. The surviving form of that original version represents, however, one of two formidable obstacles in the way of a satisfactory evaluation of Ph.'s ideas: the sheer fact that it is often hard, sometimes downright impossible, to determine exactly what he means.

This problem is not confined to part A, of course; it is a bugbear throughout the treatise as a whole; but what gives part A its uniquely excruciating character is the nature of the comparanda, equally if not even more problematic, that one would wish to bring to bear. A work like Ph.'s cries out to be tested against, and (with luck) illuminated by, other evidence; and as regards part A in particular a key element of that evidence is archaeological. When Ph. showcases this or that tower-shape, this or that wall-trace, this or that ancillary feature of *teichopoiia*, we are bound to wonder to what extent such a thing is reflected in the actual remains, or should instead be regarded as abstract theory. Furthermore, we want those remains to be datable with maximum precision, so as to make it worth asking whether Ph. was attempting to set trends or was following them, by and large. Yet such precision, reliant on Scrantonian masonry-styles and/or other means, is very often out of reach.

The data which permits such issues to be explored in respect of Ph. has only been brought extensively to bear, by those with appropriate expertise, during the last half-century or so. As late as 1961, F.G. Maier, while citing Ph. quite freely in his *Griechische Mauerbauinschriften*, noted (2.69 n.1) the lack of an up-to-date archaeological commentary on him. Maier's point was implicitly a double one: that Diels-Schramm had paid only scant attention to archaeology (preferring for the most part to operate on a plane of high abstraction), and that their edition of Ph. was by then, in any case, four decades old.

Nor had the deficiency been remedied from the archaeological side, save in individual site-reports and other publications which might invoke Ph., more or less *obiter*, in the context of particular phenomena. Testing Ph. in any way systematically against the archaeological *Realien* was a task first taken on by the Barbadian archaeologist F.E. Winter (1922–2011). In a series of articles beginning in 1959, then in a sustained way in his monograph *Greek Fortifications* (Toronto & London 1971) and again in later work, Winter did emerge as the champion of the approach of viewing sites and remains – especially though not exclusively Hellenistic or putatively Hellenistic ones – through a Philonian lens.

Winter's determination to do this, and his ingenuity in doing it, not only for individual architectural elements but also on the macrocosmic level of wall-traces (see first 'The indented trace in later Greek fortifications', *AJA* 75 (1971) 413–426, at 424–426), came initially as a surprise to his professional colleagues. By no means all of Winter's ideas in this area have turned out to command agreement; but what is beyond dispute is that he brought archaeology and Ph. face-to-face as never before. Testimony to this is the fact that when, in the 1970s, two new editions of Ph. did join Diels-Schramm, they were both embedded in broader contextual studies. First, Garlan's 1974 commentary provided readers and users of Ph. for the first time with, in effect, a digest of the archaeological picture *in toto*. (Garlan's commentary on part A fills almost 40 pages, slightly more than the space devoted to parts B-D

put together; and the disparity remains striking even when allowance is made for illustrations.) A.W. Lawrence's *Greek Aims in Fortification*, in 1979, did not aspire to match this in detail but it does, unsurprisingly, bring archaeology much to bear on Ph. and *vice versa*. Subsequently, two relevant monographs – J.-P. Adam, *L'architecture militaire grecque* (Paris 1982) and especially A.W. McNicoll, *Hellenistic Fortifications from the Aegean to the Euphrates* (with revisions and an additional chapter by N.P. Milner: Oxford 1997) – have concentrated on Ph.'s home ground, so to speak, and have invoked his testimony copiously in doing so. And work along the same lines has continued on a smaller scale.

The overall outcome of this is mixed – and, I venture to say, is always likely to be. Individual advances (or suggestions of advances) can be striking; for the instance of Hyllarima see A6 under **τοὺς δὲ κατὰ τοὺς πυλεῶνας**. In the round, however, no amount of wishing it to be so can make archaeological remains usably datable if they are not; and in any case the comparanda from the other quarter, Ph. himself, often remain extremely challenging to comprehend. As will be seen, the key passage for the macrosmic (Winterian) approach, A84 [*86.3–11*], presents a cluster of frustrating difficulties; and the preceding material which ought to shed bright explanatory light upon the six trace-types summarized there does so, to a degree, for some of them but hardly at all for others. In particular, the organisation, and application, of A1–38 [*79.1–82.42*] is opaque, open to widely differing interpretations. All I can claim, for what follows here, is that I have tried to steer a navigable way through them.

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A1 [79.1–7]: foundations

A1.1 [*79.1*] **<Φίλων Ἀρίστωνι χαίρειν. …>** (<'Philon to Ariston, greetings. …>'). Though the phrase is not preserved in any of the principal manuscripts, the analogy of how *Bel.* and (*mutatis mutandis*) *Pneum.* begin has made it conventional to supply it here too.

After it, Graux 108 and Garlan 291 proceed straight to Πρῶτον μὲν δεῖ κτλ. Diels-Schramm 17 note that 'Anfang fehlt', and this is surely right. The other two treatises open with a discursive preface, before getting down to substantive matters. Here, evidently, it has fallen victim to the processes of epitomization. I follow Schoene in marking a lacuna.

A1.2 [*79.2*] **τοὺς οἰκοδομοῦντας πύργους <καὶ τείχη>** ('those who are building towers <and walls>'). The manuscripts have πύργους only, and Lawrence 75 evidently sees no problem in that. Most other scholars, though, are troubled (explicitly or implicitly) by such a restrictive scope, given what ensues. If the paradosis is to stand, it seems necessary to follow Diels-Schramm 17 with n.1 and Garlan 329 n.1*a* in believing that these 'πύργοι' are not only towers but fortifications *tout court*. The alternative course of action, finding it intolerable that such a loose sense of the word might need to be posited in this very opening sentence but never again afterwards, is emendation. Schoene – who did not emend – notes Brinkmann's suggestions in that regard:

change πύργους to τείχη (where a broad sense is unproblematic) or delete τοὺς οἰκοδομοῦντας πύργους as an intrusive gloss. My addition of <καὶ τείχη> follows Graux, and is based on the phrase *turrium murorumque fundamenta sic sunt facienda etc* in Vitruvius 1.5.1, which clearly derives from the original version of Ph.'s A1.

This combination in building-inscriptions – standing for 'die Gesamtbefestigung' (Maier 2.78) – occurs in two documents from Ph.'s era, both, as it happens, from small island-poleis in the SE Aegean: Maier nos.48 [SGDI 3486; IG xii.3 30], Telos (lines 6–7: σεισμοῦ τε γενομένου καὶ τῶν [οἰκῶν?]| [κ]αὶ τῶν τειχέων καὶ τῶν πύργων διασεισθέντων), and 49, Rhodian Kamiros (lines 24–27: κατανοή|σας τε Καμιρεῖς ἱκανὰ χρήματα δαπανοῦντας καθ' ἕκασ|τον ἐνιαυτὸν εἰς τὰν τῶν πύργων καὶ τῶν τειχέων ἐπισκευάν).

A1.2–3 [*79.2–3*] **ὀρύξαντας μέχρι πέτρας ἢ ὕδατος ἤ τινος ἐδάφους** ('once they have dug as far as rock or water or some (other) bottom'). Cf. again Vitruv. 1.5.1, *ad solidum et in solido*.

'Rock' is self-explanatory, and Diels-Schramm 17 n.2 plausibly refer 'water' to 'die Anlage von nassen Gräben'. As to an ἔδαφος, although a river could be said to have a natural one (Xen. *Cyrop*. 7.5.18, on the Euphrates at Babylon), the context here perhaps means, or at least includes, one made or enhanced by human hand (for which cf. in another context A21.4 [*81.18*], on towers 'in which the artillery-emplacements will have been constructed ἐκ τοῦ ἐδάφους'). A celebrated instance of this occurs in Plut. *Cim*. 13.6 (with A. Blamire, *Plutarch: Life of Kimon* (*BICS* Supplement 56: London 1989) 152–153), on the foundations for the eventual Athenian Long Walls. Garlan 329–330 cites others known from archaeology. Involving various permutations of compressed earth, gravel, sand and ash, they extend from the western Mediterranean (Heloros in SE Sicily, Massalia) to several instances in northern Black Sea regions: (H)istria, Olbia, Philippopolis (Plovdiv). (On the first and second of this group see A. Wasowicz, 'Les "fondations de terre" d'Olbia et d'Histria', *Archaeologia* 20 (1969) 39–61, at 41; on the last, in brief, Lawrence 446 = n.2 to chap.8.)

According to Lawrence 201–203, at 202, '[b]uilders generally took care, as Philo recommends, to expose hard rock wherever any could be found near the surface, but seldom dug through soft ground down to the water-table; his instruction to that effect applies only to the best standard of work (as at Thasos, where the foundations reach 10 cm. below the water-table)'.

A1.3–4 [*79.3–4*] **ἀσφαλῶς τοῦτον ἀποστερεώσαντας τὸν τόπον** ('once they have … safely firmed up this place'). Diels-Schramm 17 print the emendation of ἀσφαλῶς to the adjective ἀσφαλοῦς (Graux 108), which must then be taken with the noun it immediately follows, ἐδάφους (see under the preceding lemma). Like Schoene and Garlan 291 (and Lawrence 75, evidently), I accept the adverb; it is in all three manuscripts (and adequately attested in Ph. as a whole: cf. A52.4 [*83.41*], A74.4–5 [*85.16–17*], B22.2–3 [*87.46–47*], D68.2 [*101.38*], D87.4 [*103.19*], and *Bel*. 56.16). Note also, incidental though it be, Plutarch on Cimon (preceding lemma): τὴν πρώτην δὲ θεμελίωσιν … ἐρεισθῆναι διὰ Κίμωνος ἀσφαλῶς.

Ph. uses the very rare verb ἀποστερεόω again at A19.5–6 [*81.4–5*]; see the Comm. thereto.

A1.4–5 [*79.4–5*] **τιθέναι τοὺς θεμελίους ἐν γύψῳ** ('should lay the foundations in mortar'). Further references to this substance occur in A8.3–5 [*80.7–9*] (the topmost stones in stone towers to be bound together ἐν μολίβῳ καὶ σιδήρῳ καὶ γύψῳ) and in the pair A11.3–4 [*80.21–22*] (τιθέντες καὶ τοὺς λίθους ὀρθίους ἐν γύψῳ) and A20.2–3 [*81.7–8*] (τιθέντες ὀρθίους αὐτοὺς ἐν γύψῳ). In stating that Ph. 'seems to favour it chiefly for foundations', Winter, *Fortifications* 91–92 (cf. 93, 325) unjustifiably privileges the present passage at the expense of the others, though he does register them later (*Fortifications* 136 n.38).

LSJ distinguishes between three related senses of γύψος. Two concern a natural mineral deposit (*chalk* or *gypsum*) and one – the one relevant here – a product that can be manufactured from it (Thphr. *Lap*. 65): *cement* (or, the translation I join Winter and others in preferring, mortar), a preparation which, with sand added, results in the very hard fixative implied here, and explicit, virtually, in Vitruvius's phrase *ea impleantur quam solidissima structura* (1.5.1). Besides Ph.'s four instances, see Diod.Sic. 2.10.5 (on the stratified roof of the Hanging Gardens of Babylon, two layers of which are baked brick bound ἐν γύψῳ) and particularly Arr. *Anab*. 2.21.4 on the massive walls of Tyre at the time of the celebrated siege by Alexander the Great in 332: λίθοις μεγάλοις ἐν γύψῳ κειμένοις ξυμπεπηγότα. R.A. Tomlinson, '*Emplekton* masonry and 'Greek structura'', *JHS* 81 (1961) 133–140, at 138–139, attractively suggests that building-techniques involving mortar, previously unknown (or at least unattested) in Greece and the Aegean, became known precisely after and because of what Alexander's engineers learned after the siege of Tyre (see *imprimis* Arr. *Anab*. 2.18–24 with HCA 1.239–256), but exerted little influence outside the realm of architectural and poliorcetic theory. Actual (lime-) mortar-based construction – despite Ph.'s advocacy of it – seems to have remained a rarity in the superstructure of walls, and even rarer for their foundations, as prescribed here. (For Dura-Europos, on the middle Euphrates, in this regard see F. Cumont, *Les fouilles de Doura-Europos 1922–3* (Paris 1926) 4; Winter, *Fortifications* 93; Lawrence 424; McNicoll, *Fortifications* 11.)

See further Garlan 330–331; Milner in McNicoll, *Fortifications* 222–223.

A1.6 [*79.6*] **μὴ ἔνδον τῶν θεμελίων … ῥηγνύωνται** ('be not shattered within the foundations'). A verb associated with the destruction of walls, specifically, since the twelfth book of the *Iliad* (see e.g. lines 90, 198, 223–224, 257, 291, 308, 418, 440). Amongst historians' accounts, Xen. *Hell*. 5.2.5 provides a relevant instance: after Agesipolis has dammed the R.Ophis at Mantineia in 385 and the rising water-level is softening the lower layers of brick and threatening the upper, 'the wall first began to shatter and then, too, to lean over' (τὸ μὲν πρῶτον ἐρρήγνυτο τὸ τεῖχος, ἔπειτα δὲ καὶ ἐκλίνετο. For the cognate noun ῥῆξις see under A63 **Τούτων**.

The phrase ἔνδον τῶν θεμελίων, otherwise unattested, is not simply Ph.'s awkward variant on the proverbial (Plb. 5.93.2) ἐκ τῶν θεμελίων – foundations and all, root and branch – but embodies a precision that is genuinely required here; the point is the desirability of the strongest possible foundations.

A1.6–7 [*79.6–7*] **μηδ' ὑπορύττηται τὰ τείχη** ('and the walls (as a whole) be not undermined'). This must mean, in context here, actually brought down by undermining (otherwise this second clause belongs logically before rather than after μὴ ἔνδον τῶν θεμελίων οἱ τοῖχοι ῥηγνύωνται).

What sounds like an instance of solid foundations on rock, thwarting an assault by undermining, occurs in the accounts of Philip V of Macedon's siege of a town called Prinassos, somewhere in the Rhodian Peraia, in 201: Plb. 16.11.3, Polyaen. 4.18.1, Front. *Strat.* 3.8.1; HCP 2.512–513. (Philip's clever response to this setback was to give the impression that it had not occurred, by creating heaps of soil brought from elsewhere; the defenders were duly deceived into surrendering.) Note also Liv. 36.25.4 on Philip's siege of Lamia, undertaken jointly with the Romans, in 191: political reasons aside, it is abandoned in part because undermining operations encountered 'flint, almost impervious to iron' (*silex paene impenetrabilis ferro occurrebat*).

For undermining operations by attackers – what C7.1 [*91.19*] will call μεταλλεύσεις – see again A51.1–3 [*83.34–36*], A68 [*84.39–42*], C7 [*91.19–24*], D10.8–9 [*97.26–27*], D12.2–3 [*97.35–36*] and D30 [*99.11–13*]. Winter, *Fortifications* 133–134 has general observations (here abridged) on the topic from early times: '[a]s city walls increased in scale, and began to extend around the lower city as well as the citadel, the foundations had to be more carefully laid. [… G]reater precautions were necessary where the ground was fairly level, especially if it was also swampy; and sound footings were also needed for walls that stood on hillsides with a generous covering of earth. […] In all probability the foundations were generally taken down to bedrock or hardpan, if possible. In damp or swampy terrain they would go down at least to the level of the water-table, perhaps even further, in order to make them as solid as possible on the treacherous and shifting ground. In the sixth and fifth centuries, however, this practice […] was not always followed. Even at the beginning of the Peloponnesian War the walls of Plataia cannot have been founded on bedrock; for the defenders could not then have removed the earth from the Spartan mound through an underground shaft, as described by Thucydides (2.76.2). Unfortunately for defenders, such strategems could be employed by both sides. From the fourth century onward mining was one of the commonest methods of breaching a city's walls [again 226 with n.26]. In the interests of safety it was therefore advisable to place the foundations of a wall where they could not be undermined. The many recorded instances of successful mining operations show that this precaution was frequently neglected, no doubt in order to save time and money. Yet the extra effort would have been well spent; for where the walls did rest on bedrock, e.g. at Prinassos [see above], mining was quite impossible'. (The fact that Prinassos surrendered to Philip was a testimony to his guile, as indicated.)

The classic tactic which came to be associated with the undermining *per se* was to prop up the tunnel thereby created and then time the actual collapse of the wall to a nicety by setting fire to the props (cf. Veget. 4.24; Syrianus Magister 13.5–12). For this see e.g. Diod.Sic. 13.59.8 on the Carthaginians at Himera in 409, and 18.70.5 on Polyperchon at Megalopolis in 318; also Polybius on Philip V at Pale in 218 (5.4.8) and at Phthiotic Thebes in 217 (5.100.5). (At Prinassos in 201 – see

above – the tactic is mentioned as part of the deception: 16.11.5–6.) From a later period see Joseph. *BJ* 2.435–436, on Menahem ben Yehuda at Jerusalem in 66 CE; and cf. *BJ* 5.466–472 for the same tactic employed in defence (Jerusalem, again, in 70 CE).

A2–8 [79.7–80.11]: towers

A2.1–2 [*79.7–8*] **κατὰ τοὺς ἁρμόττοντας τόπους** ('in accordance with places which are appropriate'). An important, if obvious, principle (whether expressed by ἁρμόττειν or ἁρμόζειν): see also A15.2 [*80.34*], A30.3–4 [*82.4–5*], A36.2–3 [*82.29–30*], C15.2–3 [*92.9–10*]; and outside Ph. e.g. Plb. 5.4.6 (which gives rise to a standard supplement in Diod.Sic. 17.45.2).

A2.2–3 [*79.8–9*] **τοὺς μὲν [ἀντὶ τῶν στρογγύλων] ἔξωθεν περιφερεῖς κτλ** ('Some of them should be rounded on the outside, etc.'). The deletion is Schoene's, accepted by Diels-Schramm 17 and Garlan 291 (though not, evidently, by Lawrence 75: 'not circular but rounded externally'). For a generically similar one see D41.3–4 [*99.50–51*]. In fact, as adjectives describing towers, Maier 2.80 with n.50 regards στρογγύλος (used in two Athenian documents from the third quarter of the fourth century: his nos.10.82–83 and 20.20) and Ph.'s περιφερής as synonymous.

'Rounded' towers are mentioned again in A5.1 [*79.20*] (and their outward-facing curvature, περιφέρεια, in A40.4–5 [*82.48–49*] and A64.2–3 [*84.25–26*]), and περιφερής is the adjective that Ph. will also use to describe undulating, drumlin-like terrain (A84.9 [*86.11*]) and the shape of beams (C16.1 [*92.15*]) and "tortoises" (D38.1–2 [*99.37–38*] and D40.3–4 [*99.46–47*]). By contrast A64.1–2 [*84.24–25*] has the more precise 'semi-cylindrical' towers (τῶν ἡμικυλινδρικῶν πύργων), but here in A2 the same point is made by the elaborate addition ἔνδον δ' ἔχοντας ἐπιφάνειαν οἵα γένοιτ' ἂν κυλίνδρου τμηθέντος κατὰ τὴν βάσιν δίχα. Syrianus Magister 12, in reference to hexagonal towers (see under the next lemma), expands Ph.'s ἔξωθεν into something more ponderous, κατὰ μὲν τὴν ἔξω αὐτῶν ἐπιφάνειαν καὶ ἀπέναντι τῶν πολιορκούντων (12.10–11), but compresses Ph.'s ἔνδον δ' ἔχοντας ἐπιφάνειαν οἵα γένοιτ' ἂν κυλίνδρου τμηθέντος κατὰ τὴν βάσιν δίχα into the simpler κατὰ δὲ τὴν ἔνδοθεν αὐτῶν ἐπιφάνειαν κυλινδροειδεῖς (12.13–14).

For such towers in the fourth century and on into Ph.'s period see Garlan 151 and 193, the latter discussion with illustrative instances. As well as Demetrias in Thessaly, founded in 293 (towers: F. Stählin et al., *Pagasai und Demetrias* (Berlin 1934) 19), they include exemplars at four Peloponnesian sites: Gortys (R. Martin, 'Les enceintes de Gortys d'Arcadie', *BCH* 71–72 (1947–1948) 81–147, at 130–132), Mantineia (G. Fougères, *Mantinée et l'arcadie orientale* (Paris 1898) 147–150), Megalopolis (E.A. Gardner et al., *Excavations at Megalopolis 1890–1891* (London 1892) 111) and Messene (most conveniently in Adam, *L'architecture* 62–63). One could add e.g. Selinus, Sicily (see under A25 **Τοιαύτης**), and tower 4 at Side, Pamphylia (Garlan 345 fig.45; Lawrence 391 fig.86); see also Adam, *L'architecture* 62–65, focussing on Messene (above) but with brief mention, with photographs, of more.

As a general point Winter, *Fortification* 194 comments that '[t]owers which presented a rounded surface toward the enemy were ideally suited to the conditions of Hellenistic warfare, since there were no broad, flat surfaces to receive the full impact of enemy balls. Yet they do not appear to have been relatively any more frequent in Hellenistic times than they had been earlier. In extant systems of middle and late Hellenistic date important instances of the use of curvilinear towers [...] are few in number. Several examples do, however, occur at angles and gateways, that is in the two places where round towers had always been most favoured. It is therefore likely that Hellenistic engineers, when they were guided by any theory at all in giving preference to towers of curved plan, adhered to the view of their classical predecessors, that is, that an angle could be more effectively guarded by a round tower than by any other type'. Lawrence 386 adds technical and practical detail: Ph. 'disapproves of quadrilateral towers which projected at right angles to the curtains, because of their liability to suffer damage when struck broadside on by a ram or by stones thrown from a catapult; in particular, the corners might be broken away. Curvature of the front evaded these drawbacks but entailed additional and very careful masons' work with a template [on which see A64.3–5 [*84.26–28*]]: every block was required to taper back at a uniform angle, whether it composed the entire or only half the thickness, and where it met either the outward or the inward face the upper and lower edges were necessarily dressed to the same arc as in its fellows. Shortages of time or money would therefore have limited the number of rounded towers even if their superiority were universally recognized'.

A3.1–2 [*79.11–12*] **τοὺς δὲ ἑξαγώνους καὶ πενταγώνους καὶ τετραγώνους κατακευάζοντας** ('But make others hexagonal and pentagonal and tetragonal'). Hexagonal towers recur in A6 [*79.21–26*]; pentagonal ones in A44.4–6 [*83.10–12*] and A48 [*83.25–27*]; tetragonal ones in A5 [*79.20–21*], A7 [*79.26–80.5*] and A61 [*84.13–18*]. Vitruv. 1.5.5 changes the emphasis of Ph. here, insisting on only round or polygonal designs and rejecting tetragonal ones as too vulnerable to damage (a point Ph. goes on to address in the remainder of A3): *Turres itaque rotundae aut polygoneae sunt faciendae: quadratas enim machinae celerius dissipant quod angulos arietes tundendo frangunt, in rotundationibus autem uti cuneos ad centrum adigendo laedere non possunt.*

The first and second of these designs would in practice present the same external shape if (as Garlan 331–332 n.3*a* with fig.32 presumes) the gloss on ἑξαγώνους given in Syrianus Magister 12.11–13 authentically reflects Ph.'s own concept: ἑξαγώνους τε καὶ ἰσοπλεύρους, τῶν μὲν δύο εὐθειῶν ἀναιρουμένων ὑφ' ὧν ἡ ἐντὸς γωνία γίνεται, μιᾶς δ' ἀντ' αὐτῶν ἐπιζευγνυούσης τὰς παραλλήλους εὐθείας ('hexagonal and equal-faced, but with the two sides which create the corner inside [the wall] removed and in their place a single one yoking together the parallel sides'). If this is so, however, theory and practice are at odds with each other. Actual hexagonal towers such as the one at Hyllarima (below under A6 **τοὺς δὲ κατὰ τοὺς πυλεῶνας**) present not two but three external faces, thus giving them a superior field of fire over pentagonal ones (by being able to fire straight ahead); and since this is one of the very advantages Ph. will claim for them, in A6, it seems to be Syrianus alone who has missed the point. (This of course raises a larger question: why would pentagonal towers ever be preferred over hexagonal ones? The answer – offered by Marsden, *Development* 150 in respect of Poseidonia/Paestum [see below], but also applicable elsewhere – probably lies in idiosyncracies of terrain in particular circumstances.)

Winter, *Fortifications* 195 makes the general observation that '[t]he chief advantage of the polygonal tower lay in its combination of the oblique surfaces of the round tower with the economy of labour and material of the square and rectangular types. Part of the all-round coverage of the curvilinear type was lost; nor, I think, could the polygonal type have accommodated quite as large a number of weapons in a given floor-area. But some of the advantages of the round tower could be recovered by increasing the number of sides in the polygon. This is probably the explanation both of the multiplicity of tower-plans from the later fourth century onward and of the numerous experiments with various polygonal types'.

Along with half-round towers (and fully round ones, nowhere mentioned by Ph.), archaeological/architectural remains indicate that tetragonal – whether square or rectangular – was the normal or default design. According to Lawrence 378 these constitute 'at least 90 per cent of the total known at all periods, presumably because the shape involved less trouble than any other to masons and builders alike'; cf. Adam, *L'architecture* 48–57, with copious photographs. Nevertheless, as a riposte to the lingering, pre-Winter orthodoxy – still faintly discernible in Marsden, *Development* 147–150 – that Ph.'s advocacy of other polygonal shapes was to a large extent divorced from reality, Garlan 332–335 n.3*a* was able to assemble a significant dossier of evidence for pentagonal ones and, in particular, hexagonal ones (including cut-cornered tetragonal ones – a design perhaps mainly intended to remove unusable corner space: so Winter, *Fortifications* 196). Garlan provides accompanying figures for five of the better-known instances: 260 fig.26 (hexagon at the south flank of the "Lion Gate" at Miletos; A. von Gerkan, *Milet II.3: die Stadtmauern* (Berlin 1935) 46–47), 333 fig.33 (hexagon at hellenistic-era Samos [the caption 'pentagonale' is a slip]; cf. Adam, *L'architecture* 58 with fig.27), 334 fig.34 (cut-cornered hexagons on the Aspis and Lari(s)sa hills at Argos, on which see generally IACP 605; Marsden, *Development* 162 diagram 12*b*), 335 fig.35 (hexagon at Thisbe, Boiotia: F.G. Maier, 'Die Stadtmauer von Thisbe', *MDAI(A)* 73 (1958) 17–25, at 24–25, and Maier 1.126–128]), and 335 fig.36 (cut-cornered hexagon at Argolid Asine: O. Frödin and A.W. Persson, *Asine ...1922–1930* (Stockholm 1938) 100–102]). One such tower noteworthy not only for its its shape but also by being quite precisely datable is the pentagon built into the south wall at Poseidonia in Lucania, at a time thought to be soon after 273, when Poseidonia became the Roman colony of Paestum. See on this structure Winter, *Fortifications* 246–247 with figs.268–270; Garlan 333; Marsden, *Development* 148–149, with 162 diagram 12*a*; Adam, *L'architecture* 245–247. Note also, in general, Adam, *L'architecture* 58–59, and McNicoll, *Fortifications* 8–11 (esp. table 4b) on Asia Minor, and 155 on Ph.: 'Philon frequently alludes to polygonal and curvilinear towers as if they were being given serious thought in his day. Hexagonal and curvilinear towers are mentioned in A3, hexagonal shapes are recommended at gateways in A6, pentagonal towers with [= set in] slanting curtains are mentioned in A44, and

semicircular tower construction is discussed in A64. Since Philon was interested in something more than pure theory and since he tended to recommend and discuss the latest ideas, it is likely that practical application of these concepts was taking place during and after his lifetime'.

See further under the next lemma; and under A6 **τοὺς δὲ κατὰ τοὺς πυλεῶνας**.

A3.2–3 [*79.12–13*] **ἐκτιθέντας κατὰ μίαν γωνίαν** ('thrusting (these last) out at one corner'). Rochas d'Aiglun, Graux and Diels-Schramm understand this phrase as relating to all three tower-shapes just mentioned; Garlan 291 and Lawrence 75 restrict its scope to the tetragonal ones. This second interpretation seems to me the correct one – hence my parenthesis – in making it clear that that they are to be set 'plus au moins obliquement par rapport aux courtines adjacentes': so Garlan 337 n.3*b*, with several instances, including ones schematically depicted in his 336 fig.37 (tower at the southern extremity of the acropolis of Aigosthena in the Megarid; cf. Adam, *L'Architecture* 52 fig.22, and 217–218) and 336 fig.38 (southern section of the circuit-wall at Alinda; cf. Adam, *L'architecture* 50 fig.20, and in full now A. L. Konecny and P. Ruggendorfer, 'Alinda in Karia: the fortifications', *Hesperia* 83 (2014) 709–746, esp. 714–730). See also e.g. Adam, *L'architecture* 51 fig.21 with 147–149 (tower 4 at Kydna, Lycia) and 52 fig.23 (tower on south side of gate at Oiniadai, Akarnania).

Towers with more than four sides, no matter how placed, are bound to have more than the single projecting corner referred to here (and again in A4.3 [*79.18*], τὴν ἐκκειμένην γωνίαν; and cf. also A7.3, quoted below). Even so, Ph.'s aim – explained in the remainder of the sentence, ἵνα κτλ., and on into A4 – that his towers will have the advantage of mutual protection, by oblique artillery fire, against oncoming 'machines' (as well as enhanced intrinsic strength against rams and rock-projectors: see lemma below) is one which encompasses the pentagonal and hexagonal shapes also. (Diels-Schramm 18 fig.2 is a simple illustration of this, if one were needed, though it makes the mistake of depicting the pentagonal and hexagonal shapes as being for practical purposes the same; on this point see already above under **τοὺς δὲ ἐξαγώνους**.)

When this phrase itself reappears it uses the doubly compound verb προεκτιθέναι (in a literal rather than the common figurative sense): see A7.3 [*80.2*] (προεκτιθέναι μικρὸν κατ' ὀξεῖαν γωνίαν, of tetragonal brick towers) and A59.1–3 [*84.5–7*] (Ἐν δὲ ταῖς ἀρχαίαις τειχοποιίαις δεῖ τοὺς πύργους προεκτιθέναι κατὰ μίαν γωνίαν).

A3.3–5 [*79.13–15*] **ἵνα ἀλλήλους ἀμύνωσιν ἐκ τῶν πλαγίων ἀφιεμένων τῶν βελῶν εἰς τὰ προσαγόμενα μηχανήματα** ('in order that they may protect one another, with projectiles being discharged from the flanks at the machines being brought against them'). On what Ph. means by 'machines' see Introduction C.ii.b.

This ἵνα-clause and the one paired with it – see the next lemma – introduce at an early stage in Ph.'s recommendations the twin, symmetrical facets of artillery in the siege-warfare of this era: the attackers will certainly have it and make the most of it, so the defenders must not only counteract that but have their own weaponry and deploy it to best effect. For defence artillery see again A6.6 [*79.26*], A16.4–5 [*80.44–45*], A20.9–10 [*81.14–15*], A21 [*81.15–25*], A25 [*81.34–37*], A32 [*82.6–14*], A49–50 [*83.27–34*], A55–57 [*83.47–84.3*], B49.4–6 [*89.49–51*], B53.9 [*90.22*], C1 [*90.46–49*], C6 [*91.15–19*], C10 [*91.33–38*], C12.1–3 [*91.40–42*], C13.3–4 [*91.45–46*], C18.5 [*92.26*], C22.3–4 [*92.38–39*], C26 [*93.1–3*], C39.2–3 [*94.2–3*], C41 [*94.8–10*], C56–58 [*95.9–20*], C64 [*95.36–39*], C67–71 [*95.49–96.14*], D12.4–6 [*97.37–39*], D17.8–10 [*98.11–13*], D31–33 [*99.13–20*], D49 [*100.20–22*], D51.1–5 [*100.25–29*].

See further under the next lemma.

A3.5–6 [*79.15–16*] **καὶ ἵνα μήθ' ὑπὸ τῶν κριῶν μήθ' ὑπὸ τῶν πετροβόλων τυπτόμενοι μηδὲν πάσχωσιν** ('and in order that they suffer no harm when struck, neither by rams nor by rock-projectors'). Milner in McNicoll, *Fortifications* 219: '[n]on-rectangular designs became commoner from the third century BC onwards, as the theories of engineers like Philon on the deflection of blows from tower walls took effect'.

Such damage – from artillery, at any rate – and how best to avoid it will be a recurring theme in what follows: see again at A6.2–5 [*79.22–25*], A8 [*80.5–11*], A9.5–6 [*80.15–16*], A11.6–7 [*80.24–25*], A13 [*80.28–31*], A19 [*80.51–81.5*], A23–24 [*81.29–33*], A27 [*81.40–43*], A29 [*81.47–82.2*], A35.1–4 [*82.22–25*], A41–42 [*82.50–83.5*], A46.1–4 [*83.18–21*], A49 [*83.27–30*], A61 [*84.13–18*], A65 [*84.28–34*], A73 [*85.6–13*] and C3–6 [*91.3–19*]. (Specification of the size of machine is made in A29 and A73: see the Comm. there.) On attacking artillery more generally see also A20.8–9 [*81.13–14*], A26.1–3 [*81.37–39*], A70–71 [*84.47–85.4*], A81 [*85.41–46*], D9.2 [*97.10*], D17.7–10 [*98.10–13*], D25 [*98.42–45*], D31–33 [*99.13–20*], D104–105 [*104.19–28*]. (Attacking rams (*krioi*) receive separate mention again at A51.4 [*83.37*], A73.6 [*85.11*], D25.2 [*98.43*], and D64.3 [*101.27*].)

Marsden, *Development* 113–115 discusses Ph. on artillery and provides at 115 a table (summarizing 99–115) of all attested uses of it – whether abstractly in Ph. or concretely in narrative accounts – under the heads of 'Neutralization [*sc.* by attackers]' (sub-divided into 'covering fire' and 'in support of sallies') and 'Destruction [*sc.* by attackers]' (sub-divided into 'anti-personnel', 'in repulse of sallies', 'walls', 'battlements', 'counter-battery', and 'other siege engines'). Specific sieges from Perinthos (unsuccessfully besieged by Philip II in 340) to Peiraieus (successfully besieged by Sulla in 86) are named, but only as the tip of the iceberg of 'all sieges', which are regarded as illustrating the two categories of anti-personnel fire by the attacking side and covering fire by the defenders. The same table is reproduced in McNicoll, *Fortifications* 5, where Milner's note adds, to the instances of defence use against other siege engines, Diod.Sic. 22.10.4–7 (Pyrrhus of Epirus's failure against Lilybaeum, the Carthaginian stronghold in W Sicily, in 276). Ph. is cited, explictly or implicitly, in all categories of use except attackers' repulse of sallies.

A4.1–3 [*79.16–18*] **αἱ ... καταφοραὶ τῶν πληγῶν** ('the impacts of the blows'). Similar phrases later will simply refer to blows, πληγαί: A8.2 [*80.6*], A19.4–5 [*81.3–4*], A29.2–3 [*81.48–49*], A65.4–5 [*84.31–32*], C17.3–4 [*92.21–22*], C70 [*96.10–12*] and D51.1–2 [*100.25–26*]; in the present passage, though, the language is a little more elaborate. The noun καταφορά in reference to the downward slashing or cutting stroke of a sword is common in Polybius (see Plb. 2.30.9, 2.33.3–6,

3.114.3, 6.23.4 & 7, 18.30.7), and cf. also e.g. Plut. *Dion* 34–35, at 34.6–7, on the bogus injuries of Sosis.

Later in the sentence – which has forgotten the mention of rams and is entirely about artillery – the participle περικλώμεναι is used in the unparalleled (though perfectly intelligible) sense of projectiles ricocheting.

A5.1 [*79.20*] **Ἁρμόσει δέ πως** ('It will be somehow appropriate'). The idiom, perhaps conveying a degree of hesitancy, recurs in D14.1–3 [*97.45–47*], Τὰ γὰρ τοιαῦτα κηρύγματα μάλιστά πως εἴωθε τῶν ἐναντίων τὰς διανοίας <ταράττειν>.

What will (or may) be appropriate, in Ph.'s contention, is transmitted as τοὺς περιφερεῖς καὶ τοὺς τετραγώνους (*sc.* πύργους) ὥσπερ νῦν οἰκοδομοῦνται τίθεσθαι (while having hexagonal ones at gateways: A6 [*79.21–26*]). Nineteenth-century scholars (Egger, Rochas d'Aiglun, Graux, Schoene) referred the phrase 'just as they are built nowadays' to what precedes it, and were therefore obliged to posit a lacuna either before or after τίθεσθαι. Diels-Schramm, Garlan and Lawrence see no need for this, and I agree. That said, the phrase ὥσπερ νῦν οἰκοδομοῦνται τίθεσθαι as transmitted appears to conflate (as Garlan 338 n.5*a* comments) the ideas of how to build a tower and where to position it. In a full discussion of the passage Winter, *Fortifications* 196–198 makes the attractive suggestion that Ph.'s original read ὥσπερ νῦν οἰκοδομεῖσθαι καὶ τίθεσθαι, which eliminates the difficulty; I have adopted it here.

A6.1–2 [*79.21–22*] **τοὺς δὲ κατὰ τοὺς πυλεῶνας ἑξαγώνους δεῖ συντελεῖν** ('But the ones at gateways it is necessary to effect as hexagonal'). Brinkmann ap. Schoene proposed a supplement to this phrase, ἑξαγώνους <ἢ πενταγώνους>, but no editor has adopted it. As transmitted, Ph. does want these towers to be six-sided.

The verb here, συντελεῖν, is really no more than a variant of the more commonplace ones employed elsewhere (οἰκοδομεῖν, κατασκευάζειν, ποιεῖν), but it will become a favourite one throughout the treatise: again A11.5 [*80.23*], A15.2 [*80.34*], A33.6 [*82.19*], A37.3 [*82.34*], C17.3 [*92.21*], C51.1–2 [*94.36–37*], D17.2 [*98.5*] and D24.4 [*98.37*]. Sometimes the specific idea of completing a task is conveyed, but not necessarily. For this verb in building-inscriptions see e.g. Maier no.11 [IG ii^2 463] (lines 4, 108–9: Athens), 26 [IG vii 4263, Syll.^{3} 544] (line 4: Oropos), 49 (lines 23, 31, 35–36: Kamiros), 82 [Syll.^{3} 495; translation Austin^2 no.115] (lines 39–40, 60: Olbia), 88 (line 24: Odessos).

These 'gateways' are something more macroscosmic – Lawrence 75 has 'gateway-complexes' – than mere 'gates' (the term which suffices later in the sentence, and also in C30.1–2 [*93.11–12*] and D2.3 [*96.30*]): see L. Robert, review of Maier vol. I, in *Gnomon* 42 (1970) 579–603, at 593. For instances of the term πυλεών in the documents included by Maier, see his nos.20 (lines 24–32: Eleusis), 63 (line 8: Teos), 66 (line 6: the same), 68 (line 3: the same), 82 [see above] (lines 48–49: Olbia), and 84 (line 3: the same). Winter, *Fortifications* 228–233, at 228, observes that '[i]n Philo's estimation the plan of the actual gateway was obviously far less important than the efficacy of the flanking towers, which were the key to defence'. Ph. as transmitted has nothing to say on, for instance, the question of whether the orientation of the gateways themselves should be axial or tangential, i.e. with a direct approach – the norm on the ground – or an indirect one; so McNicoll, *Fortifications* 6–7 (at 6). However, since Vitruv. 1.5.2 advocates the latter (*excogitandum uti portarum itinera non sint directa sed scaeva*), one might well suspect that the epitomization process has left out this point. (Alternatively, as assumed by Fleury, *Vitruve* 136, Vitruvius's remark applies to posterns, not main gates, and is thus to be linked with A34 [*82.21–22*].)

It is generally assumed that Ph. is speaking here of pairs of such towers; explicitly so in Lawrence's translation ('(a pair of) hexagonal towers'), and cf. also the hypothetical plan in Winter, *Fortifications* 229 fig.239 (followed by Garlan 339 fig.41). Nevertheless Marsden, *Development* 147–148 cites instances, including Argolid Asine, of what seem to be single ones. In any event, P. Brun, 'Les fortifications d'Hyllarima, Philon de Byzance and Pleistarchos', *REA* 96 (1994) 193–204 brings to bear this passage and two earlier ones, from A2.1–2 [*79.7–8*] (τοὺς πύργους οἰκοδομεῖν κατὰ τοὺς ἁρμόττοντας τόπους) and A3.1–3 [*79.11–13*] (τοὺς δὲ ἑξαγώνους καὶ πενταγώνους καὶ τετραγώνους κατασκευάζοντας ἐκτιθέντας κατὰ μίαν γωνίαν), on the phenomenon of the surviving walls of Hyllarima, in inland Caria. Its east-facing gate is flanked by a pair of "Philonian" towers, one pentagonal and one hexagonal. The whole complex was built, Brun argues, at the turn of the fourth to third centuries, when Cassander's brother Plistarchus held sway over much of Caria (cf. in brief Lawrence 150), and thus appreciably earlier than Ph.

A6.2–3 [*79.22–23*] **ἵν' αἵ τε γωνίαι ἧττον θραύωνται** ('in order that the corners may be broken less'). Though verb is poetic in origin – see LSJ s.v. – instances in prose include Hdt. 1.174.4, on the sixth-century Knidians' attempt to turn their peninsular polis into an island but suffering ocular and other injuries from shards of rock (θραυομένης τῆς πέτρης). Subsequently it became part of the colourless technical vocabulary of writers like Ph.: compare θραυόμενον (of the string-cord of a catapult being damaged) in *Bel.* 57.46, and elsewhere e.g. Hero, *Bel.* 24.39–41 on the need to avoid damaging contact beween catapult components (ὅπως μὴ συγκρουόμενοι θραύωνταί τε καὶ θραύωσιν).

A6.5 [*79.25*] **δυσεκπορεύτους** ('difficult to leave by'). Specifically, by troops going out on sortie: ἐκπορευόμενοι (A9.4 [*80.14*], A42.2 [*83.4*]).

The adjective is very rare, but cf. Joseph. *AJ* 13.60 (reproduced in Zonaras, *Epitome Historiarum* 1.327) on a swamp so described; in battle in 150 the Seleucid king Demetrius I, on horseback, falls into it and is killed by the forces of his opponent Alexander Balas.

A6.6 [*79.26*] **τάς τε ἐπιστάσεις τῶν βελῶν ἔχῃς πανταχόθεν** ('and also (in order that) you may have emplacements of artillery (facing an attack) from every quarter'). The manuscripts proffer this feminine noun as either the faulty ἐπιτάσσεις (P) or ἐπιτάσεις (V). Graux 112 tentatively suggested ἐπιστάσεις, and I follow Garlan in printing it; for discussion see Garlan 339 n.6*d*. If this is correct, the phrase used here will be a variant on Ph.'s usual one-word βελοστάσεις (A21.3 [*81.17*], A32.3 [*82.8*], C67.4 [*96.1*], C68.2 [*96.3*]). Unlike Lawrence 73, I have no quarrel with this

as such, and the alternative option, V's ἐπιτάσεις (preferred by Schoene and Diels-Schramm 18), brings its own difficulties, whether it be translated loosely or (in Lawrence's 'bearings') precisely. (The apparent parallel cited in LSJ s.v. vanishes on close inspection: in App. *Lib.* 441, τὰς ἐπιτάσεις αὐτῶν does refer back to the catapults just mentioned there but in a technical sense which cannot apply here in Ph.; women's hair is being cut off for the catapults' 'tightenings', i.e. springs.)

In place of πανταχόθεν Schoene tentatively suggested πανταχόσε ('in every direction'), but nobody has followed him.

On the general point being made here see already under A3 **τοὺς δὲ ἐξαγώνους**.

A7.2 [*80.1*] **πλινθίνους** ('(towers) of brick'). Note generally Lawrence 208: '[f]or practical purposes at least, it may be assumed that the Greeks did not build fortifications in burnt brick'; rather, the material in question is sun-dried clay- or mud-brick. (Lawrence 210 describes its manufacture, including the incorporation of a reinforcing element such as straw, hay or hair.) With that understood, I refer to 'brick' throughout.

This is the first of three occurrences in Ph. of the adjective πλίνθινος. Though he accepts the translation 'brick' here, Garlan's note (339 n.7*a*, cf. 370 n.12*b*) points out that both it and its related feminine substantive πλίνθος can also be applied to precision-cut ashlar stone(s), not sundried brick; see also LSJ s.v. πλίνθος, II.1, and Maier 2.88 n.103. In B12.2 [*87.14*] the πλίνθιναι arches in granaries are made of stone blocks, as B13 [*87.18–20*] shows, but contrast D74.3–4 [*102.21–22*], εἰς τοὺς λιθίνους τοίχους … καὶ εἰς τοὺς πλινθίνους. For the noun see A62.3 [*84.20*], B9.4 [*86.51*], B12.3 [*87.15*], B15.2 [*87.22*], B22.2 [*87.46*] and B49.2–3 [*89.47–48*]. My default translation is 'brick', though 'block' seems appropriate at A62, B12 and B22. (On neuter πλινθίον in A60.2–3 [*84.9–10*] see the Comm. thereto.)

On these brick towers see further under the next lemma; and on *Lehmziegelbau* generally Maier 2.71–75; Winter, *Fortifications* 69–73. Note also Milner in McNicoll, *Fortifications* 221: 'a survey of fortifications does not reveal the prevalence with which mud brick was used in Greek fortifications. […] all commentators agree on the importance and frequency of the use of this material, which was commended by the ancients for its shock-absorbent qualities'; thus e.g. Paus. 8.8.7–8 (mentioning also its most significant drawback: vulnerability to water) and Apollod. Mech. 157.7–158.3; Garlan 13, 198; Lawrence 212–213; Adam, *L'architecture* 19–20.

A7.2–3 [*80.1–2*] **τετραγώνους δεῖ ποιεῖν καὶ προεκτιθέναι μικρὸν κατ' ὀξεῖαν γωνίαν** ('it is necessary to make them tetragonal and to extend them outwards a little at a sharp corner'). This shape is specified for brick towers 'obviously so that the products of the mould would fit uncut' (Lawrence 387).

Beyond that, these recommendations (and indeed A7 [*79.26–80.5*] as a whole) pose three interpretative questions, as Garlan 339 n.7*b* remarks. One of them – whether this type of tower is also, like the hexagonal stone ones of A6 [*79.21–26*], intended for association with gateways – can surely be answered (*pace* Lawrence 73) in the negative; irrespective of materials, Ph.'s wish for a hexagonal shape there has been made plain. Beyond that, no answer seems possible to another question

ÉCOLE FRANÇAISE BIBLIOTHÈQUE D'ATHÈNES

raised: the connection, if any, between, material and shape. So one issue remains: what is meant by προεκτιθέναι μικρὸν κατ' ὀξεῖαν γωνίαν and (by extension) what follows it, κατὰ κύκλου τμῆμα συνάπτοντας τοῖς μεταπυργίοις ὥστε ἀπαρτίζειν αὐτῶν τὴν βάσιν τῷ πέρατι τῶν μεταπυργίων? (On ὥστε κτλ see the next lemma.)

Garlan himself (339 fig.42, following a very similar one in Rochas d'Aiglun) has the towers placed obliquely. In broad terms that must indeed be what Ph. had in mind, not least because of the correspondence between προεκτιθέναι μικρὸν κατ' ὀξεῖαν γωνίαν here and two phrases elsewhere: ἐκτιθέντας κατὰ μίαν γωνίαν in A3.2–3 [*79.12–13*] (q.v. Comm. above) and προεκτιθέναι κατὰ μίαν γωνίαν in A59.2–3 [*84.6–7*]. Yet two difficulties persist: even a shorter connection with the curtains than the one depicted in the Rochas/Garlan schema – a slender, neck-like structure – makes the entire tower extend outwards far more than 'a little'; and in any case it would be most odd to call a 90° right-angle 'sharp'. The second of these problems seems to require the assumption, one not usually made, that Ph.'s brick tetragons are irregular. As to the first, it is in part solved, I believe, by the very different approach to this passage taken by Diels-Schramm 18–19. Whereas their explanatory translation of κατ' ὀξεῖαν γωνίαν as 'an einem spitzen Winkel (*der Mauer*)' – my italics – ignores the parallels of A3.2–3 and A59.2–3, above, where such phrases unambiguously refer to the towers themselves, both their fig.3 here and their comparable fig.9 at A39–40 [*82.43–50*] properly reflect the fact (ignored by Garlan) that Ph.'s phraseology in both passages is so very similar; see also Lawrence 73. In short, here implicitly in A7 as well as explicitly in A39–40, Ph. is talking about a wall-trace 'comprised out of semi-circles, such that their hollows face the enemy', with a tower (of brick here, but perhaps not necessarily elsewhere) placed at each outward extremity. If that is correct, my only quarrel with Diels-Schramm would be that their fig.3 shows square *rectilinear* towers; contrast the obliquely-set (stone) one in their fig.2.

A7.5–6 [*80.4–5*] **ὥστε ἀπαρτίζειν αὐτῶν τὴν βάσιν τῷ πέρατι τῶν μεταπυργίων** ('so as to have their back make a fit with the extremity of the curtains'). Compare the similar phrase at A40.3 [*82.47*], ὥστε ἀπαρτίζειν ταῖς γωνίαις αὐτῶν, and elsewhere Aristot. *Pol.* 5.1313a7–8 on the circumstances – an elite of equals – conducive to the imposition of a tyranny (μηδένα διαφέροντα τοσοῦτον ὥστε ἀπαρτιζειν πρὸς τὸ μέγεθος καὶ τὸ ἀξίωμα τῆς ἀρχῆς). For ἀπαρτίζειν in Ph. see already *Bel.* 52.3 (διάμετρος … ἀπαρτιζομένη τοῖς ἀριθμοῖς) and 75.21 (κύλινδρον ἀπαρτίζοντα τῷ πάχει).

A8.1–2 [*80.5–6*] **Ἵνα δὲ μὴ λαμβάνωσιν κατάκρουσιν μηδ' ἠντιναοῦν** ('In order that they do not receive a shock of any kind'). The noun is very rare; its other attestations are principally in two passages of the Aristotelian *Problemata* (874b12, 963b9), where its more specific sense is 'downward pressure' (LSJ s.v.).

A8.3–5 [*80.7–9*] **ἐν μολίβῳ καὶ σιδήρῳ καὶ γύψῳ οἱ ἔσχατοι τῶν λίθων πρὸς ἀλλήλους δεθέντων** ('let the last of the stones (in stone towers) be bound to each other in lead and iron and mortar'). Though Diels-Schramm 19 accept the transmitted τῶν ἐσχάτων λίθων, the case for emendation looks strong. This is Schoene's,

followed by Garlan 292; it preserves more of the paradosis than Graux's οἱ ἔσχατοι λίθοι. (The imperative δεθέντων is Schoene's adjustment of δὲ θέντων in ms V.)

On mortar see above, under A1 **τιθέναι**. The other two materials, lead and iron, are much more widely attested in this sort of context. In the literary evidence the *loci classici* are Hdt. 1.186.2 on the bridge of 'Nitocris' across the Euphrates in the centre of Babylon, the stones of which she joined in this way (δέουσα τοὺς λίθους σιδήρῳ καὶ μολύβδῳ; cf. Diod.Sic. 2.8.2, τοὺς δὲ συνερειδομένους λίθους τόρμοις σιδηροῖς διελάμβανε καὶ τὰς τούτων ἁρμονίας ἐπλήρου μόλιβδον ἐντήκουσα), and Thuc. 1.93.5 on the Themistoclean walls of Peiraeius, with their large blocks σιδήρῳ πρὸς ἀλλήλους τὰ ἔξωθεν καὶ μολύβδῳ δεδεμένοι. Garlan 340 n.8*b* has a dossier of archaeological evidence, bringing together other instances of this technique used in walls *tout court* (e.g. Heloros in Sicily, Herakleia Trachinia, Isaura, Skyros) and the more common use of it in a structure's most 'soignées' and fragile elements (e.g. the "Lion Gate" and the "Sacred Gate" at Miletos, the Gate of Zeus at Thasos, and parts of walls or towers at Assos, Eretria, Pergamum, and various sites in Epirus). See also R. Martin, *Manuel d'architecture grecque* I (Paris 1965) 239; Lawrence 216.

Since the lead and the iron make a pairing – because the technique does entail iron clamps encased in lead – emendation is a possibility worth considering here. Rochas d'Aiglun (who misremembered the Thucydides passage as stating that the blocks in the Peiraieus walls were 'cimentées avec du gypse') and Graux proposed either ἐν μολίβῳ καὶ σιδήρῳ ἢ γύψῳ or else ἐν γύψῳ, ἢ μολίβῳ καὶ σιδήρῳ. Another possibility which produces the same bipartite result would be ἐν μολίβῳ καὶ σιδήρῳ ἢ ἐν γύψῳ.

A8.5–6 [*80.9–10*] **πρὸς τὸ τοὺς πετροβόλους παραφόρους γινομένους κτλ.** ('with a view to the rock-projectors being made to deviate etc.'). Like Garlan 292 (and Lawrence 75), I am content to see this clause as flowing naturally from what precedes it, on the securing of the topmost stones. The alternative (Graux, Schoene, Diels-Schramm) punctuates after the imperative δεθέντων and posits a lacuna. To fill it, before this πρὸς τὸ κτλ. phrase, Brinkmann ap. Schoene suggested συντελείσθωσαν δὲ τὰ μέν (before the corresponding τὰ δέ at A9.1 [*80.11*]), Diels in Diels-Schramm 19 (apparatus only) ἀσφάλειαν ἐχέτωσαν.

For the adjective παράφορος in this sense of ricocheting see also A61.3–6 [*84.15–18*] and A65.4–5 [*84.31–32*] (together with Brinkmann's supplement – which I do not adopt – in A20.8–9 [*81.13–14*]: see the Comm. there, under **παρατεινομένων**). Rihll, *Catapult* 161 comments that 'if the finial blocks are mortared and [but see under the preceding lemma] clamped' and the result is such ricocheting, this 'implies rather weak stone-throwers', whereas in A29 [*81.47–82.2*] (and elsewhere) he advocates protective bossing, which implies the need for it. While there is no absolute contradiction between these two policies, I agree overall that in Ph.'s day 'it is not clear whether stone-throwers were yet capable of doing *serious* damage to *well-built* walls' (my emphases).

A8.6 [*80.10*] **τὰς ἐπάλξεις** ('the parapets'). To 'sever' (ἀποκόπτειν) the parapets is Ph.'s standard idiom for describing damage of this kind: see also A60.5 [*84.12*], C5.4–5 [*91.14–15*], C14.10–11 [*92.5–6*]. Compare, in another context, Polyaen. 3.9.30: Iphicrates persuaded the Athenians τὰ ὑπερέχοντα τῶν οἰκοδομημάτων ἐς τὰς δημοσίας ὁδοὺς ἀποκόπτειν ἢ πιπράσκειν. (The parallel use of ἀποκόπτειν there is striking even if the anecdote as a whole is more authentically presented in [Aristot.] *Oec.* 2.1347a4–8, where the initiative is attributed to the tyrant Hippias, and it is confined to the sale aspect (ἐπώλησεν). See generally D. Whitehead, 'Polyaenus on Iphicrates', *CQ* 53 (2003) 613–616.)

Parapets (*epalxeis*) feature again in A14–16 [*80.32–45*], A60 [*84.8–12*], D10.1–3 [*97.19–21*], and a supplement in D75.2 [*102.24*]. Ph. will also use the term προμαχών: see C14.4–5 [*91.50–51*], C23.1–3 [*92.40–42*], D73.7–8 [*102.18–19*], and generally Maier 2.82. I translate ἐπάλξεις as 'parapets' and προμαχῶνες as 'battlements', though it is not an absolute certainty that Ph. intended to convey – especially at D10, a parapet on a palisade – the precise post-classical sense of *epalxis* employed by modern scholars: see e.g. Winter, *Fortifications* 140; Garlan 344; McNicoll, *Fortifications* 14 (and Glossary s.v.: 'windowed parapet, continuous parapet wall pierced with slits and windows, not crenellated, sometimes roofed; NB before the 4th cent. BC *epalxis* refers to a crenellated parapet wall (*epalxion*, breastwork)').

See further in the Comm. to A14 **κατάστεγα**.

A9 [80.11–16]: spur-walls at towers

A9.1–2 [*80.11–12*] **Τὰ δὲ μεταπύργια ἐπικαμπίους ἔχοντα ἐκ τῶν πλαγίων τοίχους** ('When curtains have jog walls (originating) out of the flanks'). The transmitted text here is ἐπικαμπίας ἔχοντα ἐκ τῶν πλαγίων τοίχων; the two emendations, now standard, are Schoene's. One might think, alternatively, of retaining τοίχων and changing ἐπικαμπίας to ἐπικάμπια (see below), but I am content to follow orthodoxy.

Garlan 292 ('murs de crochet') and Lawrence 75 ('spur-walls') both subsume Ph.'s adjective-plus-noun, ἐπικαμπίους … τοίχους, into a single noun or noun-phrase. Though I have preferred not to suppress the adjective altogether, its exact import is ambiguous. LSJ s.v. I renders it 'curved', both for this passage and for the related neuter plural substantive τὰ ἐπικάμπια (mis-classified there, in my opinion, as adjectival; see rather Arnim, *Index* 31) in A30.2–3 [*82.3–4*]. But Diels-Schramm 19 understand it, surely rightly, as *hakenförmige* (hook-shaped). Their 20 fig. 4 depicts possible designs, but see further below.

Winter, *Fortifications* 246–247, at 246 provides exegesis: '[t]he defenders would have been compelled to emerge or re-enter one at a time, and would have been specially vulnerable at these moments. It was evidently to meet this very danger that the device which Philo calls an ἐπικάμπιον [so in A30; here, apparently, an ἐπικάμπιος τοῖχος – DW] was evolved. The *epikampion* was simply a roofed chamber built in the angle between tower and curtain. Toward the field it presented a solid wall, which may have returned a short distance toward the face of the curtain. The *epikampion* might be entered either from the ground-floor chamber of the tower, or by means of an opening in the wall beside the tower. A much wider opening in the flank gave ac-

cess to the field. *Epikampia* provided convenient places for a fairly large number of men to muster section by section, take up battle formation, and emerge ready for the attack, instead of forming ranks in full view of the enemy'. A footnote adds, summarily: 'Philo's *epikampion* was simply the outer arm of an L added to the flank of a tower'. Not all these details, of course, can be extracted from Ph. alone. Some result from a juxtaposition of his testimony with the two archaeologically semi-preserved instances, Demetrias in Thessaly (Winter, *Fortifications* 246 fig.267 for one model; Garlan 256 fig.23 for two; see also Lawrence 84, 288 and esp. 340) and Herakleia-by-Latmos in Caria (Winter, *Fortifications* 245 fig.264; Lawrence 340–341; Adam, *L'architecture* 240 fig.134). Even so, I am not aware of any reliable evidence for Winter's 'roofed chamber' concept; only protective *walls*, in whatever configuration(s), seem justified. My translation 'jog walls' derives from the most plausible interpretation of ἐπικάμπια in the Skotoussa wall-survey inscription (**Appendix 4**): see under A30 **τὰ ἐπικάμπια**.

See further under the next lemma; also A35 [*82.22–27*] and A67–68 [*84.36–42*].

A9.3–4 [*80.13–14*] **τὸ μὲν πλάτος ἐχέτωσαν δίπηχυ <τὸ δὲ …>** ('let these … have a breadth of two cubits (0.924 m.) <and a (?)height of …>'). Graux 116 posited a lacuna here, surely rightly: the preserved τὸ μέν phrase seems to require an answering τὸ δέ one, giving the size of another dimension of these structures. Schoene's supplement takes it to be depth (<τὸ δὲ πάχος …>); Diels's, confined to the apparatus in Diels-Schramm 19, height (<τὸ δὲ ὕψος τετράπηχυ>). The latter, arguably, is more likely to have been specified, given the first of the two purposes which are to be served: protecting troops going out on sortie (see the next lemma).

A9.4 [*80.14*] **ἵνα μὴ οἱ ἐκπορευόμενοι τιτρώσκωνται** ('in order that those going out on sorties are not wounded'). The participle ἐκπορευόμενοι, 'those going out', recurs in A42.2 [*83.4*], where, even more clearly than here, it does mean 'going out on sorties'. Compare Aen.Tact. 1.2 (Τοὺς μὲν γὰρ ἐκπορευομένους δεῖ συντετάχθαι πρὸς τοὺς ἐν τῇ πορείᾳ τόπους κτλ), and cf. more generally e.g. Xen. *Anab.* 5.1.8 (Ἐπὶ λείαν γὰρ ὑμῶν ἐκπορεύσονταί τινες) and the beginning of the anecdote in Aen.Tact. 24.4 (Τῷ ἄρχοντι τοῦ Ἰλίου ἦν οἰκέτης ἐκπορευόμενος ἐπὶ λείαν ἀεί, καὶ μάλιστα ἐν ταῖς νυξὶν ἐξεπορεύετο κτλ).

Ph. 'advocates sorties unreservedly' (Lawrence 426). (On their place in Hellenistic siege-strategy for defenders see under A36 **Αἱ δὲ ὀρυττόμεναι τάφροι**.) Front. *Strat.* 3.17.1–9 has a collection of sortie-related anecdotes from the First Punic War onwards.

A9.5–6 [*80.15–16*] **τὰς πυλίδας** ('the posterns'). Again at A33–34 [*82.14–22*], A47.3 [*83.25*] and B23 [*87.47–49*]. (In C18.2 [*92.23*] Diels-Schramm and Garlan print Brinkmann's conjecture θυρίδες (ap. Schoene) for the transmitted πυλίδες, and in C20.4–5 [*92.32–33*] the noun missing from the phrase τὰς ἑκατέρωθεν οὔσας τῶν πύργων is perhaps πυλίδας but more probably διόδους; see the Comm. there.)

Posterns are mentioned by historians from the fifth century onwards: see e.g. Hdt. 1.178–191 passim (Babylon); Thuc. 6.51.1 (a 'badly built one' at Katana allows the Athenians to enter in 415); Xen. *Hell.* 2.4.8 (a sea-facing one at Eleusis in

403). For general discussion, with archaeological examples, see Winter, *Fortifications* 234–251; Lawrence 335–342; Adam, *L'architecture* 93–98, 132–135; McNicoll, *Fortifications* 7–8.

A10 [80.16–19]: intramural perimeter road

A10.1–2 [*80.16–17*] **Ἀπεχέτω δὲ τὸ τεῖχος ἀπὸ τῶν οἰκιῶν ἑξήκοντα πήχεις** ('Let the wall stand away from the houses by sixty cubits (27.72 m)'). This is very much a counsel of perfection. Most actual measurable instances are in the range 3–8 m. (Garlan 341 n.10*a*, Lawrence 76), i.e. simply enough space for a modest perimeter road. Even the extreme cases – '40 feet' (12.33 m.) in an Ephesian inscription of the early third century (Syll.[3] 1182, quoted in the note to Syll.[3] 936; SGDI 5597; Maier no.71) lines 3–6; 13.80 m., in parts, at later-Hellenistic Rhodes (*ADelt* 23 (1968) Chr.ii 445; Lawrence 76) – come nowhere near Ph.'s figure. See generally Winter, *Fortifications* 125 n.60. A uniform policy on the matter such as Ph. promulgates here might not reflect real-life circumstances, however. In the section of the Skotoussa wall-survey (SEG 43.311: **Appendix 4**) dealing with property inside the city wall (Τὰ ἐντος τᾶς πόλιος: II.56–68) the space which must be free of it varies between one stretch of wall and another; distances of 12 feet (3.7 m.) and 20 feet (6.17 m.) are mentioned, as well as spaces for pasturage.

Graux 116 considered that in the stated rationale for Ph.'s sixty cubits, ἵνα ῥᾳδίως ᾖ παραφέρειν τοὺς λίθους, the noun should be emended to λιθοβόλους (not stones but stone-projectors), but his suggestion has not been taken up, and note anyway Marsden, *Development* 121: '[a]ncient artillery was certainly never mounted on platforms behind the main wall. In some medieval drawings, it is true, we see stone-throwing and arrow-shooting engines depicted hurling their missiles over the fortifications of a beleaguered city. But there is no evidence that the Greeks or Romans operated their machines in this way. Philon insists that a clear space about 30 yards wide should be left between the inner face of a city wall and the houses within. But his reasons are that this allows free movement for the transport of stones (ammunition, or for repairing the wall) and for relieving parties, and that it leaves room for the construction of a subsidiary ditch behind any sector of the wall that it is in danger of being of being brought down [below, under **ταφρείαν**]. He does not mention any possible use for artillery platforms, though it would have been highly appropriate for him to do so had it been applicable'.

See also A80 with Comm. to **Δεῖ δὲ καί**.

A10.3–4 [*80.18–19*] **πάροδον … τοῖς βοηθοῦσιν** ('a way along for reinforcements'). The term *parodos* recurs in A15.1–3 [*80.33–35*] and A17.2–3 [*80.46–47*], on such a thing along the top of the curtains (for guard-patrols), and in A81 [*85.41–46*] on, again, ground-level *parodoi* – and their transverse counterparts *diodoi* – outside the walls, for ensuring the protection of the outworks.

The participial phrase οἱ βοηθοῦντες is Ph.'s preferred idiom for military reinforcements, whether for the defenders, as here, or the attackers : see again at D99.5–6 [*103.49–50*] and D102.2 [*104.7*]. (Where he uses a noun instead, it is the impersonal βοήθεια: D59.6 [*101.7*], D86.1 [*103.12*].)

A10.4 [*80.19*] **ταφρείαν ἔν<ὸο>θεν ἱκανήν, ἐάν τι δέῃ** ('ample trenching inside, if needed'). The paradosis here is ἔνθεν ('on one side'); of the various suggestions for emending it, Schoene's has become orthodox. For ταφρεία see also A81.6 [*85.46*], and cf. e.g. Demosth. 18.299 (on his own record as an overseer of τειχισμός and ταφρεία in 337/6), Diod.Sic. 20.109.1, Plb. 5.2.5 (plural) and 6.34.1.

This is a scenario expanded, seemingly, in C32 [*93.25–29*]: enemy forces have breached the walls and are inside, but are caught out by hidden counter-trenching at key points; see the Comm. thereto. This proactive tactic appears to be different from the reactive, targeted counter-tunnelling mentioned in D31.1–3 [*99.13–15*] and D49 [*100.20–22*], though as Garlan 341 n.10*c* reasonably comments, it too – more exactly, its initial stage(s), inside the wall – would be facilitated by Ph.'s generous allowance of space. (As is particularly clear in A55 [*83.47–49*], the adjective ἱκανός in Ph. does sometimes convey a provision beyond mere adequacy.) A relevant example from the historians is Diod.Sic. 17.12.5: the Thebans, attempting to resist Alexander in 335, fall foul of their own intramural 'alleyways *and trenches*' (ταῖς διεξόδοις καὶ τάφροις).

Garlan 243–244 presents different scenarios of what happens after the breach or collapse of a section of wall, with illustrative episodes from Halikarnassos vs. Alexander in 334 (Arr. *Anab.* 1.21.5–6 and 1.23.1–2; Diod.Sic. 17.25–26), Megalopolis vs. Polyperchon in 318 (Diod.Sic. 18.70.5–7), and Rhodes vs. Demetrius Poliorcetes in 304 (Diod.Sic. 20.93.1 and 20.97.4); and from an earlier era cf. e.g. Plataiai vs. the Peloponnesians in 429 (Thuc. 2.76.3).

See further below, under A36 **Αἱ δὲ ὀρυττόμεναι τάφροι**.

A11–12 [80.19–27]: dimensions of walls

A11.1–2 [*80.19–20*] **Τὰ δὲ πλάτη … τῶν τειχῶν** ('The breadths of the walls'). The manuscripts are at variance here. Diels-Schramm 20 print τοίχων (P), citing in support of this τὰ πλάτη τῶν τοίχων in A20.3 [*81.8*] (cf. generally A28.1–2 [*81.43–44*]); the topic there is the sides of towers, however. I follow Schoene, Garlan 292 and (implicitly) Lawrence 77 in preferring τειχῶν (VE).

These breadths are to be οὐκ ἔλαττον δέκα πηχῶν, 'no less than ten cubits (4.62 m.)'. The figure reappears in A17–19 [*80.45–81.5*], of some of the walls of a guard-post, and in A20.3–4 [*81.8–9*], of towers. For walls, Syrianus Magister 12.3–4 is satisfied with half this minimum: Δεῖ τοίνυν τὸ μὲν πάχος οὐκ ἔλαττον πέντε πηχῶν ἔχειν (this, explicitly, for strength against rams and artillery: 12.4–6). Attested dimensions vary, over a range generally slightly below Ph's minimum requirement but sometimes above it. See Garlan 341 n.11*a*; Lawrence 76; Adam, *L'architecture* 177–178 (on Mantineia, with 4.3 m.).

On A11 [*80.19–25*] in general note Marsden, *Development* 97: '[s]ince the first half of Philon's seventh book (Παρασκευαστικά) is devoted, almost exclusively, to wall-building with a view to withstanding stone-throwers, it seems that their blows were not to be despised. He recommends 10 cubits (about 15 feet) as a thickness which would be unaffected by stone-shot. At the very least, therefore, it may be said that stone-throwers had some effect against walls of dimensions less than those suggested by Philon'.

A11.3–4 [*80.21–22*] **τιθέντας καὶ τοὺς λίθους ὀρθίους ἐν γύψῳ** ('laying the stones, too, end-on in mortar'). On mortar see already under A1 **τιθέναι**; and for the present phrase see again A20.2–3 [*81.7–8*] (of towers), τιθέντες ὀρθίους αὐτοὺς (*sc.* τοὺς λίθους) ἐν γύψῳ. In both contexts the sense of the adjective *orthios* is the one identified in LSJ s.v. III.b: 'of stones in building, *engaged lengthwise* in the wall, i.e. with only the short sides showing, *headers* (opp. stretchers)'. In French this is *en boutisses* (Garlan 292); and cf. τὰ μήκη κατὰ βάθος ἔχειν τοῦ τεῖχος in Syrianus Magister 12.28, under the next lemma. (A31.2 [*82.6*] will express the same idea with the phrase ἐπὶ μῆκος τίθενται; see the Comm. there.)

Both here and even more so in A20, Ph. might appear to be saying that *all* the stones should be ὄρθιοι, but can such a thing – headers only, not the familar headers-and-stretchers mix – be what he meant? No modern commentator has explicitly understood him in that way. The possibility cannot be categorically ruled out, to my mind, but the far greater probability on general grounds must be that his recommendation, clumsily expressed (or clumsily epitomized), is for the headers alone to be mortared. (In the present passage one could produce this sense by a small adjustment in translation, 'laying the end-on stones, too, in mortar', and in fact Lawrence 77 makes this unambiguous with his 'lay the header blocks in plaster' here in A11 and 'laying the headers in plaster' in A20, where however the Greek, quoted above, does have to be pressed a little harder to produce that sense.)

A11.4–7 [*80.22–25*] **μάλιστα μὲν ἐκ κραταιοῦ λίθου τὰ ἐπικαιρότατα τῶν μεταπυργίων συντελοῦντας, εἰ δὲ μή, ὀξεῖς· ὡς ἥκιστα γὰρ πείσεται ὑπὸ τῶν λιθοβόλων** ('in particular completing the most important (parts) of the curtains out of (particularly) sturdy stone, or if not, (using) sharp ones; for these are harmed least by stone-projectors'). Syrianus Magister 12.26–30 has an approximation of this (and the preceding ὀρθίους): Τοὺς δὲ τοιούτους λίθους μεγίστους καὶ σκληροὺς εἶναι καὶ ἀλλήλοις ἁρμόζοντας καὶ τὰ μήκη κατὰ βάθος ἔχειν τοῦ τείχους εἰς τὸ μὴ ῥᾳδίως ὑπὸ τῶν κριῶν διασείεσθαι ἢ ὑπὸ τῶν χελωνῶν διορύττεσθαι.

Since all stone appropriate for city walls must be to some degree 'sturdy', this must mean a type particularly so. (Lawrence 77 adds the adverb without parenthesis or comment.) For *krataios lithos* cf. SEG 2.829 (Damascus, third century CE: inscription in the east wall round the temple of Jupiter), ᾠκοδομήθη] ὁ πύργος ἀπὸ τοῦ τρι[σκαιδεκάτου δόμου]| κραταιοῦ λίθου. (In a letter from 256 preserved on papyrus (SB 18.13881; translation Bagnall/Derow^2 no.104), Egyptian quarrymen complain that they have been disadvantaged by the allocations of 'firm' (*sterea*) and 'soft' (*malakê*) *petra*.)

Clarification – or what may be regarded as such – of Ph.'s 'sharp' bossing comes in A29 [*81.47–82.2*]; and see also A66 [*84.34–36*]. On bossing (etc.) in general, Milner in McNicoll, *Fortifications* 220 makes the point that Ph.'s interest in it is purely tactical (and perhaps, as such, exaggerated), whereas the Greek wall-builders themselves may have given at least as much weight to the sort of aesthetic considerations highlighted by Aristotle in the *Politics* passage quoted in the introduction to part A of the commentary (7.1331a12–13, ὅπως καὶ πρὸς κόσμον ἔχῃ τῇ πόλει πρεπόντως καὶ πρὸς τὰς πολεμικὰς χρείας; cf. Garlan 101–102).

A12.1–2 [*80.25–26*] **Μὴ ἔλασσω δὲ τῷ ὕψει οἰκοδομείσθω ἢ εἰκοσιπήχῃ** ('Let it be built no less than twenty cubits (9.24 m.) in height'). Endorsed by Syrianus Magister 12.4: τὸ δὲ ὕψος πηχῶν εἴκοσι. But again, practice on the ground varied very widely: see Garlan 342 n.12*a*, citing well-preserved instances (in a range between 4.5 and 10 m., usually below Ph.'s minimum) at e.g. Demetrias, Gortys, Messene, Miletos and Priene.

Archaeological remains, for obvious reasons, are often smaller than original heights. Literary sources, conversely, might exaggerate those heights; see for instance Arr. *Anab*. 2.22.4 (Tyre), with Bosworth in HCA 1.247–248. However, there is a credible instance in Plb. 4.83, on Teichos Dymaion, present-day Araxos, the fortress on the border between Achaia and Elis (HCP 1.514) abandoned to Philip V in 213; it is described as exceptionally well fortified, with a wall nowhere less than thirty cubits (13.86 m.) high.

A12.2–3 [*80.26–27*] **ἵνα αἱ πρὸς αὐτὸ κλίμακες προσαγόμεναι μὴ ἐξικνῶνται [τοῖς τείχεσιν]** ('in order that ladders brought against it do not reach (the top)'). Diels-Schramm 21 print Graux's emendation πρὸς αὐτά, which strict grammar does require after the antecedent plural; however, τείχη is so far distant, at A11.2 [*80.20*], that it is no great surprise to find all the manuscripts proffering πρὸς αὐτό; I follow Schoene and Garlan 292 in accepting it. The (standard) deletion at the end of the clause is Graux's.

Again Syrianus Magister glosses (12.6–7): τὸ δὲ ἵνα μὴ αἱ κλίμακες ῥᾳδίως τῷ τείχει προσπίπτουσι καὶ οἱ δι' αὐτῶν ποτε ἀνιόντες ἀκίνδυνον ἔχωσι τὴν ἀνάβασιν.

Scaling-ladders recur at A26.3–4 [*81.39–40*], A79 [*85.35–39*], C39.1–2 [*94.1–2*], C65 [*95.39–44*], D4 [*96.33–37*], D9.3–7 [*97.11–15*], and (inflatable ones) D73 [*102.12–19*]; cf. also Diels's supplement in A37.5 [*82.36*], which I do not adopt. One of the oldest and simplest tools available to the besieger, they could be just as effective, given appropriate circumstances, in Ph.'s era (and beyond) as before. See generally T. Rihll, 'Simple and complex technology in Aineias: ladders and telegraphy', in Pretzler and Barley chap. 12.1.

A13 [80.28–31]: joists in walls and towers

A13.2–3 [*80.29–30*] **ξυλὰ δρύινα διὰ τέλους συνεχῆ διὰ τεττάρων πηχῶν** ('Oak timbers … end-on continuously every four cubits (1.848 m.)'). The orthodox interpretation of the passage (Rochas d'Aiglun, Graux, Diels-Schramm, Garlan) construes διὰ τέλους as 'from end to end' or the like, a sense which appears to overlap semi-tautologously with συνεχῆ; in any case, what it might mean in practice is left opaque. Only Rochas d'Aiglun and Graux provide an illustration – essentially the same one – in which the sequence of these timbers extends vertically; at their 1.85 m. intervals there is thus a column of four in a twenty-cubit-high wall (or tower). Yet do not Ph.'s phraseology and common sense alike require a horizontal sequence also? Lawrence 77 understands διὰ τέλους to mean inserted 'end-on', and provides commentary at 220: 'Philo's instruction to inset oak beams in good masonry is the earliest evidence for a practice which may have been of comparatively recent introduction, its avowed purpose being to facilitate the repair of damage caused by catapults. He requires intervals of six feet between the beams, obviously in order to localize damage within that distance, and specifies that they should be placed "end-on"; so horizontally-placed headers would divide the wall into sections six feet wide, and possibly also six feet apart vertically'.

Vitruv. 1.5.3, describing what seems to be a *murus gallicus* type of wall-strengthening with timber (cf. **Appendix 1**), advocates the use of rods made from scorched olive-wood, *taleae oleagineae ustilatae*, to act as clamps. Ph.'s suppressed original, as we see here, recommends oak, on which cf. e.g. Biton 52.4 (= 4.5: oak or ash for the stress-bearing components of helepoleis such as axles, wheels, beams and posts) and see generally R. Meiggs, *Trees and Timber in the Ancient Mediterranean World* (Oxford 1982) 44–46 and *passim*. Building inscriptions which mention timber use the generic adjective ξύλινος. For the archaeological evidence see Garlan 342–343 n.13*a* with fig.43, (H)istria.

A14–19 [80.32–81.5]: superstructure of curtains

A14.1 [*80.32*] **<τῶν μεταπυργίων> τὰ μέν** ('Some <curtains>'). I have accepted the tentative suggestion of Graux 118 that τῶν μεταπυργίων belongs here rather than in its transmitted position after Τινὰ δέ in the next sentence.

A second Τινὰ δέ comes at A17.1 [*80.45*]; thus it is clear overall (Garlan 343–344 n.14*a*) that three types of curtain-design are being described in A14–19 [*80.32–81.5*], the second and third of them presumably rarer than the first.

A14.1–2 [*80.32–33*] **κατάστεγα καὶ ἐπάλξεις ἔχοντα** ('roofed-over and with parapets'). On parapets in general see already under A8 **τὰς ἐπάλξεις**.

For 'roofed-over' walls see again C14.6–7 [*92.1–2*], κατάστεγον ποιῆσαι ταύτῃ τὸ τεῖχος, and cf. e.g. lines 52–53 of the Athenian decree of 307/6 ordering a five-year schedule of repairs for the City, Peiraieus and Long walls (IG ii^2 463; Maier no.11, with detailed commentary): καταστεγάσει δὲ κα[ὶ] τὴν πάροδον | [τοῦ κύκλ]ου. (See on this, and the topic in general, Winter, *Fortifications* 141–142; Garlan 265–266.) In Ph. too the purpose of the roof is to afford protection to patrolling guards, and any others, who use the *parodos*.

In the type-2 design, described in A15–16 [*80.33–45*], there is no structural walkway and thus no roof (Garlan 344).

A15.2 [*80.34*] **ἐν τοῖς ἁρμόζουσι τόποις** ('in appropriate places'). A principle followed throughout the treatise (see already under A2.1–2 [*79.7–8*]), but here in particular one would have welcomed an explanation of what Ph. meant by it. Winter, *Fortifications* 145–146 and (independently) Garlan 345 n.15*a* both think in terms of stretches of the wall inaccessible to heavy artillery etc. (This consideration did not, of course, require a theoretician to think of it: note Diod.Sic. 20.102.4 on Demetrius Poliorcetes' appreciation of the akropolis at Sikyon in 303: 'it is surrounded on all sides by cliffs difficult to scale, so that at no point can machines be deployed'; κρημνοῖς δυσπροσίτοις περιέχεται πανταχόθεν, ὥστε μηδαμῇ δύνασθαι μηχανὰς

προσάγειν.) More broadly, these will be sectors where constant patrolling was less vital than elsewhere because they were deemed unlikely, given the nature of the terrain immediately outside, to come under attack at all. Either way, though, it is not necessarily the case that Ph. considers this system superior to one with permanent fixed *parodoi*.

In the opinion of Bettalli, *Enea* 335, A15–16 [*80.33–45*] as a whole offer 'una versione più elaborata' of Aen.Tact. 40.1, on raising the height of a wall anywhere where it is too easy to approach (χρὴ τῆς πόλεως ὅσα ἂν ᾖ εὐπρόσοδα οἰκοδομεῖν ὕψη ἐκ τῶν ὑπαρχόντων). A similarity in the two descriptions of the thwarted enemy troops in such circumstances must certainly be acknowledged (Aeneas: ἵνα, ἄν τινες τῶν πολεμίων ἢ λαθραίως ἢ βίᾳ ἀναβῶσιν, ἐν ἀπειρίᾳ γενόμενοι μὴ δύνωνται καταπηδᾶν ἀφ' ὑψηλῶν, ἀλλὰ πάλιν ἀπίωσι [Orelli: πασιναπασι M, with corruptions indicated] μὴ ἔχοντες ὅπῃ καταβαίνωσιν; Ph. (A16.1–5 [*80.41–45*]): κυριεύσαντες γὰρ αὐτῶν οἱ πολέμιοι ἢ πάλιν ἀπίασιν, οὐ δυνάμενοι εἰς τὴν πόλιν παρεμπεσεῖν, ἢ βραχύν τινα χρόνον ἐπὰν μείνωσιν, ὑπὸ τῶν βελῶν τυπτόμενοι ἀπολοῦνται); otherwise, though, the substance is unconnected.

A15.3 [*80.35*] **παρόδους δὲ οὔ** ('but not (permanent) ways along'). On *parodoi* in Ph. see already under A10 **πάροδον**. Here and again in A17.2–3 [*80.46–47*] it means a walkway (reached by steps) along the top of a curtain-wall, as copiously attested in Maier no.11/IG ii^2 463 (above, under A14 **κατάστεγα**): lines 37, 49, 52, 69–70, 82, 89, 113. Outside Athens, instances are attested by archaeological rather than documentary evidence. See generally Winter, *Fortifications* 138–151; Lawrence 355–362. McNicoll, *Fortifications* 13 has a summary list of the dozen or so known in Asia Minor (including Ephesos, Herakleia-by-Latmos, Kaunos, Pednelissos, Perge, Priene, Side and Sillyon).

On Ph.'s description of a removable kind of *parodos*, see under the next lemma.

A15.3–4 [*80.35–36*] **ἀπὸ τῶν ἐνῳκοδομουμένων ἰκρίων τοῖς τοίχοις** ('(emanating) from the (?)scaffolding built-in to the sides'). The transmitted perfect passive participle here is the simple οἰκοδομημένων, but a compound seems needed: Schoene (apparatus only) chose προσῳκοδομημένων; Graux's ἐνῳκοδομημένων is adopted by Diels-Schramm 21 and Garlan 292 and is now standard. The governing preposition is printed as the transmitted ἀπό in all the editions, though ἐπ(ί) (Graux, and latterly Winter, *Fortifications* 144–145) might be preferable.

More importantly, the manuscripts give the genitive plural noun here as κριῶν. Since rams seem quite out of place, ἰκρίων – the most brilliant of a series of emendations in Ph. – was proffered by Emmanuel Miller, reviewing (in *Journal des Savants* 1873, 385–396 and 427–439) Rochas d'Aiglun.* Graux 120, after mentioning but rejecting Miller's suggestion, retained κριῶν in his text, citing lines 71–72 of the

* Others which have become standard include ἐξαιρέσεως and προσήκοντα in C72.2–4 [*96.16–18*] and δεκάσαι in D99.1 [*103.45*]. The first two of these were anticipated by Haase, and in D8.6 [*97.6*] Haase's δεδιωθήσονται has been preferred to Miller's δηληθήσονται.

Athenian wall-repairing decree of 307/6 (above, under A14 **κατάστεγα**), IG ii 167: ἀπογεισώ[σει ἐκ] τοῦ ἔξωθεν γείσοις Κορινθίοις ἀναξῶν το[ὺ]ς [κ]ρ[ι]ούς ἁρμόττοντας; the reference is still given in Diels-Schramm 21; however, the revised IG ii^2 463 text of that clause of the inscription (taken over as Maier no.11) replaces [κ]ρ[ι]ούς with [ά]ρ[μ]ούς (and see already Schoene, to that effect). No alternatives to Miller's ἰκρίων have been put forward, as far as I am aware; on the contrary, its place in the text here, albeit conjectural, is accepted by all.

That said, two interconnected questions arise: (i) what did Ph. mean by 'built-in ἴκρια' (if that is indeed what he wrote), and (ii) are any of them illustrated by archaeological remains?

(i) LSJ s.v. ἴκρια, τά (which does not register the present passage) differentiates between several related meanings, of which the earliest attested is '*half-deck* at the stern of a ship'; see L. Casson, *Ships and Seamanship in the Ancient World* (Baltimore & London 1995) 179 n.58. Casson remarks that in non-naval contexts other kinds of raised platform are so denoted, which is certainly true of a case like Hdt. 5.16.1 (on the lake-dwelling Paeonian tribes, who live on ἴκρια ἐπὶ σταυρῶν ὑψηλῶν ἐζευγμένα ἐν μέσῃ … τῇ λίμνῃ) and could also extend to the theatre benches of Aristoph. *Thesm.* 395 and elsewhere. In a variety of epigraphical documents, however, the commonest meaning encountered is '*scaffolding*' (LSJ s.v. II.2, and cf. the entries for the cognate verbs ἱκριόω and ἱκριοποιέω and the nouns ἱκριωτήρ, ἱκριοποίησις and ἱκριοποιός); see generally Martin, *Manuel* I 20 n.3. Hence the translations of the present passage by Diels-Schramm 21 ('Gerüstbalken') and Garlan 292 ('échafaudages'). Archaeologically-driven discussions of the passage – on which see ii below – tend to prefer to keep *ikria* untranslated, though F.E. Winter does understand this to mean a scaffolding or framework; Lawrence 76–77 glosses it as 'presumably … cantilevered beams'; and McNicoll, *Fortifications* 151 at one point opts for 'spars'.

(ii) Nothing mentioned here so far would lend itself to the suggestion that Ph.'s *ikria* were anything other than wooden components – as, explicitly, were the removable supports (ἐπιβολὰς ξύλοις καὶ σανίσιν) which constituted the actual walkway in schemes of this kind. (Compare Vitruv. 1.5.4: *contra inferiores <partes> turrium dividendus est murus intervallis tam magnis, quam erunt turres, ut itinera sint interioribus partibus turrium contignata neque ea ferro fixa.*) However, just such a suggestion has been in play ever since the excavators of Demetrias/Pagasai proposed to identify the *stone* buttresses (or buttress-like structures) on the inner faces of certain walls, at that site and elsewhere, with Philonian *ikria* (see Stählin et al., *Pagasai und Demetrias* 58–62); and an interpretation along those lines was indeed already implicit in Diels-Schramm 22 fig.6. It has been vigorously contested, however, first by L.B. Holland, 'The *katastegasma* of the walls of Athens', *AJA* 54 (1950) 337–356, at 341–343, and subsequently in two discussions by F.E. Winter: 'Ikria and Katastegasma in the walls of Athens', *Phoenix* 13 (1959) 161–200, at 166–169, and again in *Fortifications* 143–148. See also Garlan 345–347 n.15*a*. Winter's two treatments, which bring into the debate other sites including Gortys and Side, remain fundamental, especially the second and (despite omitting Kadyanda, Lycia, which had featured in his earlier exegesis) fuller one. Residual

support for the idea of stone as well as wooden *ikria* is expressed by Lawrence 347–348 and McNicoll, *Fortifications* 151–152, but otherwise it seems fair to say that 'there is a consensus that ἴκρια means 'main spars' or 'scaffold', not stone buttresses' (Milner in McNicoll, *Fortifications* 152 n.163.

A15.5–8 [*80.37–40*] **ἵνα κατὰ τὰς γινομένας πολιορκίας λαμβάνωνται <καὶ> ὅταν δέῃ ἐφοδεύειν ἢ διακινδυνεύειν ἐπ᾽ αὐτῶν μηδὲν ἡμᾶς κωλύῃ** ('in order that they may be undertaken in accordance with the sieges that occur <and> that nothing prevents us, if need be, from using them for patrolling or for fighting'). The <καί> (Diels) does seem necessary here, and is printed in both Diels-Schramm 21 and Garlan 293. (Schoene, evidently, had found the paradosis tolerable as transmitted, but some of his colleagues wanted to reshape it in another way, by replacing λαμβάνωνται with a participle: ἐπιβαλόντας or ἐμβαλόντας (Brinkmann), ἀναβαίνοντας (Buecheler). Nobody has taken this up.)

Ph. uses the compound διακινδυνεύειν again at D28.1 [*99.3*] (Αὐτὸς δὲ ὅπως μὴ διακινδυνεύσῃς) and D101.1 [*104.1*] (Ἐὰν δε κατὰ θάλασσαν μέλλῃς διακινδυνεύειν). (There are 14 instances of κινδυνεύειν.) Of the three passages, only the second conveys any hint of LSJ's '*run all risks, make a desperate attempt*' sense.

With ἡμᾶς here cf. also ἡμῖν at A81.6 [*85.46*], D60.3 [*101.10*] and D92.2 [*103.33*], and ἡμῶν at B31.5 [*88.29*]. Ph. never uses first person *singular* pronouns in the treatise (as he had done in *Bel.*: 52.21, 56.50, 59.43, 61.12, 76.24), though in D92.2 ἡμῖν could perfectly well have been μοι. The other four passages, including the present one, employ the first person plural in order to associate the reader(s) with, as the context demands, either the besieged or the besiegers.

A15.9 [*80.41*] **βραχεῖά τις φυλακὴ καταλείπηται** ('and a token guard left on duty'). At the (or some of the) fixed points between the now-dismantled *epibolai*, evidently. For the idiom cf. D54.2 [*100.37*], κύκλῳ φύλακας καταλειπτέον, and elsewhere e.g. Hdt. 1.113.2 (τῶν τινα προβοσκῶν φύλακον αὐτοῦ καταλιπών).

A16.1–2 [*80.41–42*] **κυριεύσαντες γὰρ αὐτῶν οἱ πολέμιοι κτλ.** ('for if the enemy gain control of the(se areas) etc.'). For κυριεύειν, with its customary genitive, see again at A51.4–5 [*83.37–38*] and D61.9 [*101.19*].

On this material and Aen.Tact 40.1, see already above, under A15 **ἐν τοῖς**. Since part of Vitruv. 1.5.4 appears to echo part of A15 (see A15 under **ἀπὸ τῶν**), what Ph. goes on to say in A16 [*80.41–45*] can be regarded as the antecedent of Vitruvius's next sentence there: *hostis enim si quam partem muri occupaverit, qui repugnabunt rescindent et, si celeriter administraverint, non patientur reliquas partes turrium murique hostem penetrare nisi se voluerit praecipitare*. And within Ph. cf. generally, in any event, C22 [*92.36–40*].

A17.1–2 [*80.45–46*] **Τινὰ δὲ καθάπερ ἐν Ῥόδῳ** ('But certain (curtains), as in Rhodes'). 'Early walls with few (if any) towers cannot strictly be regarded as composed of curtains, which the Greeks called *metapyrgia* or (less commonly) *mesopyrgia*, literally 'between towers'; those terms may have been invented soon after a regular alternation of towers and curtains was introduced but do not occur in writing till the fifth century. Apparently the Greeks never took the further step of classifying curtains into types; Philo, therefore, was forced into circumlocution when he needed to particularize, writing of curtains 'such as there are in Rhodes'': Lawrence 343.

A59 [*84.5–8*] will again mention the curtain-walls of Rhodes; it was a city with which, we know, Ph. was personally familiar (*Bel.* 51.15–23). The account of the unsuccessful siege by Demetrius Poliorcetes in 305–304 (Diod.Sic. 20.81–88 and 91–100) mentions the city's then curtains several times (20.87.1, 91.8, 95.5, 97.7, 100.4) but not in sufficient detail to establish whether already at that time they displayed the particular aspects picked out here for emphasis by Ph. The apparent association, in A59, of Rhodian-type μεταπύργια with 'the old fortification-systems' (ταῖς ἀρχαίαις τειχοποιίαις; cf. A84.8–9 [*86.10–11*], ἡ ἀρχαία) might suggest as much; however, the point being made there is more likely to be the opposite one: build old-fashioned towers but with new-fangled curtains. As regards Rhodes it is much more probable anyway that features striking enough to make such an impression on Ph. were innovations made as part of later reconstruction work, whether undertaken in the aftermath of the Demetrian siege itself (cf. Lawrence 82, 363) or – more probably still, Garlan 347 n.17*a* considers (and McNicoll, *Fortifications* 153 asserts as a fact) – after the catastrophic earthquake of 227, which brought down not only the celebrated Colossus but also 'most of the walls and the dockyards' (τὸν σεισμὸν τὸν γενόμενον παρ᾽ αὐτοῖς […], ἐν ᾧ συνέβη τόν τε κολοσσὸν τὸν μέγαν πεσεῖν καὶ τὰ πλεῖστα τῶν τείχων καὶ τῶν νεωρίων: Plb. 5.88.1, with HCP 1.616 on the date). In the most recent discussion of the question, F.E. Winter, 'Philon of Byzantion and the Hellenistic fortifications of Rhodos', in S. van de Maele and J.M. Fossey, *Fortificationes Antiquae* (Amsterdam 1992) 185–209, at 187, 191 and 206–207, likewise inclines to that later date – which also causes him to raise polite doubts about Lawrence's 240s dating of Ph. himself (see Introduction, B, at n.26). We do know that significant work was done by the Rhodians immediately after the siege, in the late fourth century, when 'they rebuilt the theatre and the fallen parts of the walls and other destroyed sites far more beautifully than before' (Ἀνῳκοδόμησαν δὲ καὶ τὸ θέατρον καὶ τὰ πεπτωκότα τῶν τείχων καὶ τῶν ἄλλων τόπων τοὺς καθηρημένους πολλῷ κάλλιον ἢ προϋπῆρχον: Diod.Sic. 20.100.4), but more extensive restoration and augmentation will have been called for after the earthquake. (Besides the long list in Plb. 5.88–90 [cf. Austin[2] no.111] of donations to the Rhodians from foreign rulers and cities at that time, note e.g. an inscription, thought to belong in the same context, containing a list of subscribers 'for the strengthening of the city' (εἰς τὰν ὀχύρωσιν τᾶς πόλιος) and 'for building of tower/s' (εἰς κατασκευὰν πύργ[ου/ων): G. Konstantinopoulos, 'Ῥοδιακὰ II: πύργοι τῆς Ἑλληνιστικῆς Ῥοδιακῆς ὀχυρώσεως', *ArchEph* 1967, 115–128.)

Dating aside, can anything of what Ph. saw at Rhodes still be seen there? In the 1970s Garlan 347 and Lawrence 76 (cf. 363) posed this question, and answered it with a flat negative. A much more sanguine view is taken by Winter in the article cited above, based on more published reports (in *ADelt* and elsewhere) than were

available to his predecessors, and also on autopsy, in 1986, of 'all the major preserved stretches of the city walls that remain open and visible'. Winter provides a general city-plan and five other relevant figures, though no photographs from Rhodes itself; instead, there are five photographs of towers and a stretch of Hellenistic curtain at Perge, in Lycia, a site which Winter (195–203 *passim*) uses, as have others, as one of several comparanda with Rhodes.

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the general concept cf. Aristot. *Pol.* 7.1331a19–21, on his ideal city: δεῖ τὸ μὲν πλῆθος τῶν πολιτῶν ἐν συσσιτίοις κατανενεμῆσθαι, τὰ δὲ τείχη διειλῆφθαι φυλακτηρίοις καὶ πύργοις κατὰ τόπους ἐπικαίρους.

Describing a space in terms of how many beds or couches it could contain, as is well recognized, is not necessarily the simple matter it might look. Besides the literal interpretation, two others could be argued for. An instance like Xen. *Symp.* 2.18, where Socrates declares that he would be content to exercize in an *oikos heptaklinos*, need not be understood as a matter of quantification at all (but rather a value-judgement: the Loeb translator O. J. Todd has 'a moderate-sized room'); conversely, LSJ s. v. ἑπτάκλινος registers the present passage as an example of the adjective used 'as a measure of area'. This latter notion can be traced back to the long note in Graux 121–123 on A17 (itself summarizing a paper he had published in *Revue critique d'histoire et de littérature* 4 (1877) 6–8), aimed at demonstrating that the Greeks conceived a κλίνη as a precise unit of surface area, equating to ten square cubits. See further on the topic E. S. McCartney, 'The couch as a unit of measurement', *CPh* 29 (1934) 30–35 (doubting Graux on the possibility of attaining absolute precision); S. B. Pomeroy, *Xenophon, Oeconomicus: a social and historical commentary* (Oxford 1994) 288–289.

Not every passage that has been brought into the argument lends itself unproblematically (as Pomeroy comments) to what might be termed hyper-quantitative interpretation, including Xen. *Oec.* 8.13 where οὐκ ἐν πολλῷ τινι μείζονι χώρᾳ ἔκειτο ἢ ἐν δεκακλίνῳ στέγῃ συμμέτρῳ muddies the waters. As regards the present instance, Garlan 347 n.17*d* is probably right to believe that Ph. is using 'seven-bed' in a literal and functional way (likewise Diels-Schramm 22 with n.1 and, implicitly, Lawrence 77), though the fact that he gives exact dimensions for the thickness of the walls of these guardrooms – see under the next lemma – does not seem to me germane to the issue. What might be germane to it, conversely, is that the range of sizes attested both in literary sources for these –κλινος adjectives (Athen. *Deipn.* 2.47E-F has a repertory) and archaeologically for *dining*-rooms is almost always an odd number; noting this, Pomeroy (above) proposes the convincing emendation ἐν <ἐν>δεκακλίνῳ in Xen. *Oec.* 8.13. Accordingly, Ph. might yet be employing a term of art, borrowed from the world of social and sympotic norms, rather than asking us to visualize a bedroom for seven guards.

On the general topic of guardrooms see Winter, *Fortifications* 162 with n.44 (and more briefly 328), assembling instances of ground-floor chambers in towers. He argues that at least some of them, such as the akropolis towers at Priene, served this purpose, as did some of the curtain-walls at Herakleia-by-Latmos and Miletos; cf. Garlan 348 n.19*a*. Often, though, surviving remains make it hard to be certain. (And conversely, epigraphical allusions to φυλακτήρια can be uninformative when there is no explanatory context, as e. g. in I.Alexandreia Troas nos.1 (line 12) and 2 (line 2).)

A17.4 [*80.48*] **ὧν οἱ τοῖχοι οἱ μὲν ὀρθοὶ ἔσονται κτλ** ('of which the forward-leading sides will be etc.'). My translation 'forward-leading' aims to reflect the fact, enunciated by Garlan 348 n.17*e* (and cf. already Graux 134), that in this passage *orthos* appears to adopt the orientation of a guard making his rounds. Though Diels-Schramm 22 do not make the same observation, one of the sketches in their fig.6 is essentially the same as Garlan's 348 fig.47 (itself reproduced as Adam, *L'architecture* 40 fig.12). In both reconstructions of A17–18 [*80.45–51*] the guardrooms are ten cubits (4.62 m.) apart, such that ten-cubit-square stretches of curtain alternate with other ten-cubit squares which have Ph.'s three-cubit (1.386 m.) *plagioi* walls as the outside walls of the guardrooms.

The future indicative ἔσονται here and the present indicative ἔχουσι earlier in the sentence (πλάτη τε ἔχουσι ἑπταπήχη) show Ph. in his prescriptive/recommendatory mode; they should not be taken as statements about the actual dimensions of these features in the curtains at Rhodes.

A18.1–3 [*80.49–51*] **οἱ δὲ πλάγιοι μῆκος μὲν ἔχουσιν τὸ ἴσον τοῖς ὀρθοῖς, πλάτος δὲ τρίπηχυ** ('the lateral (sides) have a length equal to the forward-leading, but a three-cubit (1.386 m.) breadth'). See under the preceding lemma.

Having now established that the principal elements of the walls seen at Rhodes by Ph. were (*a*) integral guardrooms and (*b*) *psalides* at a level above them, we can return to the issue broached above (under A17 **Τινὰ δέ**) of how far curtains displaying these characteristics have been preserved there. Winter addresses this topic in sections 3.II.B ('Curtain Walls': 199–206) and 3.II.C ('Curtains with "barrack-rooms"; outworks': 206) of his 1992 article. In the latter discussion he briefly claims that in a surviving part of the southern walls, near present-day Lindos and Grigorios V streets, there is 'an actual stretch of curtains with "barrack-rooms", of the type described by Philon although somewhat smaller than he recommended'. (In the absence of a photograph, Winter's fig.10.6 shows this.) The earlier and longer discussion centres, for present purposes, on what is depicted in fig.10.5: a section of curtain wall almost 9 m. thick and at least c.2.5 m. high, adjoining a 'round' (horseshoe-shaped) tower with an external diameter of c.22 m., near the Great Harbour. However, no indication is given that this curtain has guardrooms, let alone *psalides*. Instead, the argument becomes generalized and speculative, even tendentious ('Since curtains of Philonian type seem actually to be preserved in the south walls [see above], it is worth asking whether these harbour defences may not have been similar in structure, but designed with a continuous and massive substructure to provide for the installation of medium-heavy artillery in vaulted chambers 2.00–2.50 m. above ground-level, as well as supporting additional engines at a higher level, above the vaulted chambers'); and in fact the question of what Ph. did or did not see, to underpin his recommendations here, falls away when Winter reiterates (cf. 187) that this imposing stretch of wall dates from the early first century.

Further reports of rescue archaeology in and around the Old Town of Rhodes have continued to mention isolated stretches of preserved wall, but, given the environmental context, they are all low – typically 2–3 courses – and thus unable to shed any light on Ph.'s *psalides*.

A19.2 [*81.1*] **τὸ τε ἀνάλωμα ἔλαττον ἔσται** ('the expense will be less'). Marsden, *Development* 126 n.2: '[h]e presumably means that the cost of a solid wall of the same height and width (15 feet) will be greater than that of a casemated wall. Even if he is right, it would surely be much cheaper to modify an existing solid wall, e. g.

by increasing its thickness, than to dismantle it completely and erect a new casemated wall in its place'.

Considerations of cost and economy – for which there is precedent, if one were required, in Aen.Tact. 11.4 on Chios (sentries to be discharged *en masse* ἵν' ὡς ἐλάχιστον δῆθεν ἀνάλωμα τῇ πόλει ᾖ) – come in again at A26–28 [*81.37–46*]); and cf. *Bel.* 56.37, 57.37–38, 61.7–8 and 62.25–34 on catapult-design.

A19.5–6 [*81.4–5*] **ταχὺ ἀποστερεώσομεν τὸ φυλακτήριον τοῦτο** ('we will swiftly strengthen this (affected) guardroom'). For the verb see already A1.4 [*79.4*] on foundations, τοῦτον ἀποστερεώσαντας τὸν τόπον. Here in A19 Lawrence 77 translates it as 'block up', which is justifiable enough in the context: damage to the outside wall of the guardroom would at the least require that wall to be strengthened from the inside, and doing so securely might be best achieved by decommissioning that particular φυλακτήριον altogether.

A20–28 [81.6–46]: towers and their apertures

A20.2 [*81.7*] **ἐκ λίθων οἵων εἰρήκαμεν** ('out of stones of the kind we mentioned'). This must be a reference back to A11 [*80.19–25*] (so Garlan 348 n.20*a*), even though strictly speaking less has been said there about the kind(s) of stone than about the securing of the headers in mortar (now repeated here: τιθέντες ὀρθίους αὐτοὺς ἐν γύψῳ); see the Comm to A11 **τιθέντας**.

Other backwards cross-references of this kind will appear in A21.10–11 [*81.24–25*], A54.4 [*83.47*] and B19.5 [*87.36*]; and cf. already *Bel.* 58.32 (and 76.35).

A20.3–4 [*81.8–9*] **τὰ πλάτη τῶν τοίχων οὐκ ἐλάττω ποιοῦντες ἢ δεκαπήχη** ('making the breadths of the sides no less than ten-cubit (4.62 m.)'). For this dimension as the breadth of *curtains* see already A17.5 [*80.49*] and A19.2–3 [*81.1–2*], on Rhodes. In *towers* it is a figure not matched in actuality: so, summarily, Marsden, *Development* 151 n.1. Garlan 348–349 n.20*b* finds nothing larger than the two western-Mediterranean instances cited by Marsden, *Development* 154: 2.70 m. in the semicircular towers outside the north gate at Selinous; 2.50 m. at Hipponion in the toe-end of Italy.

A26–28 [*81.37–46*] will make it even more clear that Ph.'s ideal tower, in this age of heavy artillery, displays solidity rather than height.

A20.5 [*81.10*] **θυρίδας** ('windows'). Again – and always plural – in A21.2 [*81.16*], A21.10 [*81.24*], A23.2 [*81.30*], A42.1 [*83.3*] (as transmitted, though see the Comm. there), B10.3 [*87.4*] (in granaries), C10.4–6 [*91.36–38*] and C15.3–4 [*10–11*]; compare e.g. Maier no.11/IG ii^2 463 (above, under A14 **κατάστεγα**) at lines 55–56, 76 and 89, and Diod.Sic. 20.85.3 and 20.91.5 on the artillery ports in Demetrius Poliorcetes' ships and helepolis, respectively, brought against Rhodes in 305–304. With the necessary exception of B10.3, all these passages in Ph. do refer to apertures which have military functions: the defensive deployment of archers (A22–24 [*81.25–33*]) and, especially, artillery. To safeguard the defenders, embrasure – bevelling *vel sim.* – is described in what follows here (see the next lemma) and is alluded to again in C10.4–6.

A20.5–6 [*81.10–11*] **ἔξωθεν στενὰς καὶ ἔσωθεν εὐρείας** ('narrow on the outside and broad on the inside'). This is a reasonable and intelligible description of internal bevelling, of the vertical sides of the window, best-suited to archers (cf. A22 [*81.25–29*]), but difficulties have been seen in what follows: ἐκ δὲ τοῦ μέσου στενὰς καὶ καταξύρους ἐκ τοῦ κάτωθεν μέρους. If one declines, as both Diels-Schramm 23 and Garlan 293 do, to follow Schoene's deletion of the words ἐκ δὲ τοῦ μέσου στενάς, the phrase introduces a second, alternative system of bevelling which had artillery in mind – and stone-projecting artillery at that. To make this plain, Schramm wanted the supplement <ἢ> ἐκ κτλ. No editor has printed it, but the editions of Diels-Schramm and Garlan and the translations of Lawrence and B. Campbell (*Military Writers* 188 no.266) all include it; I have followed suit.

In any event, what these eleven words describe appears to embrace two designs; cf. the plural οἵας in A21.10 [*81.24*]. One (*a*), expressed by ἐκ δὲ τοῦ μέσου στενάς, appears to be a *double* vertical embrasure – i.e. outside as well as inside the tower – as depicted in Diels-Schramm 23 fig.7 (and Winter, *Fortifications* 189); this is the "hourglass" shape (when looked at in plan from above) of McNicoll, *Fortifications* 11. The other (*b*) is expressed by καταξύρους ἐκ τοῦ κάτωθεν μέρους. The adjective, used again in C10.4–6 [*91.36–38*] but otherwise unattested, means in effect bevelled (literally 'shaved-down'); ἐκ τοῦ κάτωθεν μέρους perhaps means that the width of the splay is increased towards the bottom (so Lawrence 70), though Campbell translates the whole phrase as 'with a sloping sill underneath', for which cf., seemingly, Winter, *Fortifications* 189 (some such ports *sc.* will have 'sloped upward toward the exterior, presumably to match the high trajectory by which maximum range was attained with the heaviest weapons'; others 'may have been inclined downward, for use by lighter pieces that hurled balls more or less directly against the enemy line'). Instances of design *a* are well-known from Assos, Herakleia-by-Latmos, Side and elsewhere (Winter, *Fortifications* 189 with figs.151–154; Garlan 349 n.20*d*), but type *b* appears to be archaeologically unattested.

A20.8 [*81.13*] **ἵνα μὴ τιτρώσκωνται οἱ ἔνδον** ('in order that the men inside are not wounded'). In context here, οἱ ἔνδον are the men inside the towers that are being described, but note that elsewhere Ph. uses ἔνδον to mean, more broadly, 'inside' the besieged city: see A36.5 [*82.32*], C72.1 [*96.15*], D8.2 [*97.2*], D9.8 [*97.16*] (as conventionally emended), D61.1 [*101.11*], and cf. also water(s), τὰ ὕδατα τὰ ἔσω ῥέοντα, at D8.4–5 [*97.4–5*].

A20.8–9 [*81.13–14*] **παρατεινομένων <τῶν> βελῶν** ('with the (enemy) artillery being (over-)extended'). I follow Schoene and Garlan 293 in retaining this participle, transmitted in all three manuscripts. (Emendation was advocated by Brinkmann ap. Schoene, and adopted in Diels-Schramm 23: παρα<φόρων γι>νομένων; cf. A8.5–7 [*80.9–11*], A61.4–6 [*84.16–18*] and A65.4–6 [*84.31–33.*].) The sense and import of the phrase are unclear, however. Garlan 293 understands it as relating to

the *defenders*' artillery – 'et qu'ils puissent, en y disposant de biais leurs armes de jet, tirer etc'. – but Diels-Schramm 23 and Lawrence 77 are in my judgment right to think that Ph. is talking about that of the enemy.

A21.1–2 [*81.15–16*] **Δεῖ <δὲ> εἶναι τὰς θυρίδας κτλ** ('It is also necessary that the windows etc.'). Marsden, *Development* 118: '[w]here there is the […] common arrangement of a series of towers and curtains in more or less a straight line, the ground immediately in front of any one tower or stretch of curtain can be covered quite satisfactorily by catapults shooting through the side windows (θυρίδες) of neighbouring towers. […] Even at corners, catapults in towers adjacent to the corner tower can engage targets almost up to its base. Thus, when several towers can mutually support each other in this way, there does not seem to be much advantage in exposing any considerable quantity of valuable ordnance amidst subsidiary defences outside the principal barrier'. This last remark is prompted by the fact that in A32 [*82.6–14*] Ph. will recommend such exposure – in reference to what Marsden envisages as 'a somewhat unusual situation in which a small projecting portion of the fortifications covers a narrow, critical front'. See further below under A32 **κάτωθεν**.

In general, and specifically for 'windows', compare D.C. 74.10.4 on the walls of Byzantium at the time (194 CE) of the siege by Septimius Severus: 'many large towers, situated on the outside (of the wall), also had a succession of windows all round, so as to intercept the assailants within a circle; for as they were built at short intervals, and not in a straight line but some here and some there in a rather crooked arrangement, they were bound to encircle any attacking force'.

A21.3 [*81.17*] **ἐν <τοῖς τοίχοις> τῶν πύργων** ('in <the sides> of towers'). Graux's supplement is grammatically necessary, unless ἐν is wrong. (Lawrence 76 would emend ἐν to ἐκ – in fact the reading of the later manuscripts, according to Graux 124; the resultant translation 'through' relates more to ἀφιεμένοις, in the immediately following phrase τοῖς ἀφιεμένοις καταπάλταις καὶ πετροβόλοις, than to the positioning of the windows as such.)

A21.3–4 [*81.17–18*] **ἐν οἷς αἱ βελοστάσεις ἐκ τοῦ ἐδάφους κατασκευασθήσονται** ('in which artillery-emplacements will have been constructed on a (solid) bottom'). For such emplacements see what appears to be a periphrastic phrase already at A6.6 [*79.26*], and this compound noun itself again at A32.3 [*82.8*], C67.4 [*96.1*] and C68.2 [*96.3*]. Occurrences of it outside Ph. include Plb. 9.41.8 (used by attackers: at his siege of Echinos in 211 Philip V has three of them, for lithoboloi of different sizes; see Marsden, *Development* 110) and Diod.Sic. 20.85.4 (used, as in Ph., by defenders: the Rhodians, resisting Demetrius Poliorcetes, mount them on merchantships for 'catapults'); and cf. generally Athen.Mech. 22.11–12 on the option for a βελοστασία in Hegetor's fantastical (Whitehead and Blyth, *Athenaeus* 120–134) ram-tortoise. There are also instances in the Septuagint, though Garlan 165 declares at least some of them (e.g. *Ezechiel* 4.2) misunderstandings of Hebrew terminology.

On the sense of ἐκ τοῦ ἐδάφους here, effectively implying a platform, see F.E. Winter, 'The chronology of the Euryalos fortress at Syracuse', *AJA* 67 (1963) 363–387, at 382–3 (and *Fortifications* 183–184 n.91). Garlan 350–351 has a dossier of relevant archaeological evidence for such platforms in three contexts: at ground level, e.g. in tower 43 at Demetrias (Stählin et al., *Pagasai* 38) and tower D at Sounion (J.A. Dengate, 'Observations on the Sounion fortifications', *AJA* 71 (1967) 185–186); at *parodos* level on plinths of stone or the like, e.g. in other towers at Demetrias (Stählin et al., *Pagasai* 85) and in the towers of bastion 8 at the Euryalos (Winter, 'Euryalos' 382–385); and at first-floor level on floorboards supported by solid interior walls, e.g. in the so-called "St. Paul's Tower" at Ephesos (Winter, *Fortifications* 180; Garlan 263 fig.29) and in the towers of the *tetrapurgon* at Theangela, Caria (G.E. Bean and J.M. Cook, 'The Carian Coast, III', *ABSA* 52 (1957) 58–146, at 92; Garlan 351 fig.50).

A21.5–6 [*81.19–20*] **πρός τινα τῶν <μετα>πυργίων** ('towards any of the curtains'). Schoene retained the paradosis πύργων here, but his successors have adopted Graux's tentative emendation and supplement. (Brinkmann ap. Schoene suggested that the phrase καὶ τῶν μεταπυργίδων transmitted in A21.9 [*81.23*] might be a misplaced correction of the present passage.)

A21.7–9 [*81.21–23*] **συνεργοῦντες ἀλλήλοις <ἀμύνωσιν> οἱ πύργοι φερομένων τῶν λιθοβόλων ἐκ τῶν πλαγίων τοίχων** ('the towers <may defend> one another by working together, with stone-projectors being deployed out of the flanking sides'). The supplement, printed by both Diels-Schramm 23 and Garlan 294, is that of Buecheler ap. Schoene; cf. A3.3 [*79.13*].

On substance compare Vitruv. 1.5.2: *turres sunt proiciendae in exteriorem partem, uti cum ad murum hostis impetu velit adpropinquare, a turribus dextra ac sinistra lateribus apertis telis vulnerentur*. (Compare generally Veget. 4.2.) 'In practice, however, a closer spacing was often desirable, because curtains were now liable to be demolished or stormed, whereupon the towers would serve as strongpoints from which to harass the advancing enemy' (Lawrence 386).

Vitruvius's later assertion that towers should be positioned no more than a *sagitta*'s length apart (1.5.4: *Intervalla autem turrium ita sunt facienda ut ne longius sit alia ab alia sagittae missionis*; Rowland and Howe, *Vitruvius* 156 n.70 claim that the term is ambiguous as between an archer's arrow and the very much longer reach of a catapult's bolt, but in context it is surely the latter) has no counterpart in the transmitted version of Ph. (NB: Lawrence twice [386, 391] omits to register the likelihood that epitomization has brought about, here, the loss of substantive material from Ph.'s original. He takes it for granted instead that Vitruvius was using another Hellenistic source, unknown and now lost. See generally on this matter **Appendix 1**.)

A21.10–11 [*81.24–25*] **ἐν οἷς αἱ θυρίδες κατασκευάζονται οἵας εἰρήκαμεν** ('in which the windows are made of the kinds we have mentioned'). In A20.4–8 [*81.9–13*], evidently.

A22.1 [*81.25*] **<…> καὶ τοξικαὶ κτλ** ('<…> and (windows) for archers'). For the missing opening of this sentence Brinkmann ap. Schoene, citing τῶν ἐπὶ τῇ στέγῃ

κειμένων in C11.2 [*91.39*], proposed Κατασκευάζονται δὲ ἐπὶ τῇ στέγῃ; but even if C11 were fully intelligible in itself I cannot see its relevance. What we need, surely, is a mention of towers, to give τὰς θυρίδας αὐτῶν in A23.2 [*81.30*] an antecedent; Κατασκευάζοναι δὲ ἐν τοῖς πύργοις or the like. In any event the adjective τοξικαί here, feminine nominative plural, presupposes the noun θυρίδες (as noted in LSJ s. v. 3, which also cites Septuagint *Judges* 5.28 for the equivalent neuter substantive τοξικόν). Aspects of their design and fitments will now be described: A22–24 [*81.25–33*].

A similar method of allowing archers (and light anti-personnel artillery) inside a city to fire safely on their attackers is illustrated by Plb. 8.5.6 and 8.7.3 on Archimedes' loopholes at Syracuse in 214, said to be just one palm (7.7 cm.) in breadth on the outer side. (The dimension of one cubit (46.2 cm.) in Liv. 24.34.9 is tentatively understood by F. G. Moore in the Loeb edition as the width on the inner side, but Walbank in HCP 2.75 takes a harder line: 'evidently παλαιστιαῖος was unfamiliar, and Livy did not appreciate the advantage of a narrow aperture'.) Compare also Strab. 15.1.36 on the wooden peribolos at Palibothra, India (κατατετρημένον ὥστε διὰ τῶν ὀπῶν τοξεύειν).

A22.2 [*81.26*] **ἔξω τὰ στενὰ ἔχουσαι** ('with their narrow (parts) outwards'). A variant on the phrase used in A20.5–6 [*81.10–11*], ἔξωθεν στενὰς καὶ ἔσωθεν εὐρείας, confirming that there was no single word – not one known to Ph. at any rate – to describe a classic, inside-only embrasure. (Whatever exactly the adjective κατάξυρος (A20.7 [*81.12*] and C10.4–5 [*91.36–37*]) means, it is evidently not that.)

A22.3–4 [*81.27–28*] **καταγνύωσι τὰς προτιθεμένας δοκίδας καὶ τὰ μηχανήματα** ('would shatter the screens that are being put in place and the machines'). Brinkmann ap. Schoene tentatively suggested the supplement τὰ <προσαγόμενα> μηχανήματα, evidently on the model of this phrase elsewhere (A3.4–5 [*79.14–15*], A21.4–5 [*81.18–19*], A50.2 [*83.31*]; cf. also C58.1–2 [*95.17–18*] where <μηχανήματα> is the element restored, and outside Ph. e. g. Aen.Tact. 33.1, App. *Iber.* 204), but no editor has taken it up.

Unlike the aim of wounding the enemy's troops as they approach (ὅπως ἄν τοὺς τε πλησιάζοντας τραυματίζωσι: A22.2–3 [*81.26–27*]), this is too tall an order for archers to achieve, even if we tone down καταγνύωσι to something like 'weaken' (cf. LSJ s. v. κατάγνυμι I.2). Either Ph. or the summarizer is expressing himself very loosely.

These δοκίδες are translated by Diels-Schramm 24 as 'Balken'; however, whereas the ones in A79.2–3 [*85.36–37*], D37.2 [*99.33*] and D47.2 [*100.15*] *are*, apparently, planks, what is being invoked here and in four later passages (A50.1 [*83.30*], A68.3–4 [*84.41–42*], C39.1 [*94.1*] and D9.6 [*97.14*]) is something *made from* planks. Lawrence 79 opts for 'hoardings', but French scholars (Rochas d'Aiglun, Graux, Garlan) have visualized 'masques des mineurs' – as is explicit in A68.3–4 (μὴ ὑπορύττωσιν αὐτοὺς προστιθέντες τὰς δοκίδας). It is possible, *pace* Garlan 351 n.22*b*, that Ph. has in mind simpler constructions than what other writers call digging tortoises, χελῶναι ὀρυκτρίδες or διορυκτρίδες (on which see generally O. Lendle, *Schildkröten: antike Kriegsmaschinen in poliorketischen Texten* (*Palingenesia* 10: Wiesbaden 1975) 30–32; Whitehead and Blyth, *Athenaeus* 118–120); however, since he never uses that vocabulary, *dokides* might in effect be his term for them.

A23.1–3 [*81.29–31*] **σεσιδηρωμένας γὰρ καὶ ἀμφιπλεύρους τὰς θυρίδας αὐτῶν ποιήσομεν** ('for we will make the windows of the(se towers with shutters) ironclad and two-sided.'). The perfect passive participle 'ironclad' reappears in C53.4–5 [*94.46–47*], 'stakes slanting (and) ironclad' (σταυροὺς λοξοὺς σεσιδηρωμένους) in one version of an underwater harbour barrier. There explicitly, and here in A23 implicitly, it is (*sc.* external) wooden shutters which have been thus covered: 'metal-plated wooden shutters' (Winter, *Fortifications* 189, with figs.95, 113, 147); for timber reinforced in such a way cf. e. g. Thuc. 1.110.2, Aen.Tact. 20.2 & 4, 39.3, Diod.Sic. 20.91.3. Other possible iron components of shuttering arrangements are suggested in the lavish treatment of the topic in Lawrence 410–418; cf. Milner in McNicoll, *Fortifications* 220.

Ph.'s second descriptor is one with which translators and commentators have tended to struggle, since ἀμφίπλευρος has no parallels. See e. g. 'maintenues des deux côtés par des traverses(?)', Graux 125, reflected in LSJ's 'with traverses on both sides'; 'doppelseitig (2 flügelig?)', Diels-Schramm 24. At one time Lawrence ('Terms') ventured an explanation 'in the light of the round tower in Andros which has the aperture protected by slabs of stone projecting from the wall at right angles'; however, in *Aims* 70 (cf. 193–194 on this multi-storey tower itself) the suggestion is tacitly abandoned in favour of a line of interpretation proffered by Garlan 352 n.23*a* (following G. Roux, *RA* 1966, 279), who translates 'à double revêtement'. This rests on the analogous term ἑτερόπλευρος, sometimes ἀτερόπλευρος, used of stone blocks in the accounts of the fourth-century Delphic naopoioi (Syll.^{3} 247), and suggests for the sense of Ph.'s ἀμφίπλευρος a shutter protected on both of its faces. If that is correct, Ph.'s concern is to protect the shutters themselves, when they are open just as much as when they are closed. Alternatively, it seems to me, what he meant, rather, is what Lawrence 412–413 calls a two-leaved shutter, i. e. in two vertically-divided halves, each hinged on the side.

A24.1–2 [*81.32–33*] **οὐ ῥᾳδίως … τὴν ἔφιξιν ποιήσονται** ('will not easily effect their reach'). The noun – oddly glossed by Arnim, *Index* s. v. with *ascensio* – is very rare; LSJ cites only the present passage, but it also occurs in Jul. Afr., *Kest.* 1.1.23–24 (ὑποδραμόντων αὐτῶν τὴν ἔφιξιν).

A25.1–3 [*81.34–36*] **Τοιαύτης δ' οὔσης τῆς τοιχοποιίας τῶν πύργων τὰς διόδους ὡς μεγίστους καὶ ψαλιδοειδεῖς ποιήσομεν** ('With the fortification-system being of such a kind we will make the doorways of the towers as large as possible and vault-shaped'). Rochas d'Aiglun took the view that τῶν πύργων belongs with 'fortification' (τοιχοποιίας V, τειχοποιίας VE), but nobody has followed him. The *diodoi* of towers are also mentioned in e. g. Thuc. 3.23.1 (Plataiai, 428/7).

For vaults or arches cf. already A17.1–2 [*80.45–46*] and again A47.1–2 [*83.23–24*] and B23.2 [*87.48*] (granaries) – but outside the present passage the adjective 'vault-shaped' is found only in medical writers, as a term of anatomical description for the *fornix* of the brain.

The stated purpose of having these tower-entrances 'as large as possible and vault-shaped' is to maximize the manoevrability of the petroboloi that will go into them: πρὸς τὸ ῥᾳδίως τοὺς πετροβόλους εἰσφέρειν καὶ μεταφέρειν ὅταν δέῃ (A25.3–4 [*81.36–37*]). Commenting on the mid-third-century defences built outside the North Gate at Selinous (see already under A21 **ἐν οἷς**), whose pair of great semi-circular towers had, in one instance at least, large rear openings, Marsden, *Development* 145 suggested that the purpose of this was precisely to facilitate what Ph. had in mind in the present passage: 'the rapid transfer of artillery – even heavy pieces – into and out of the tower'. Lawrence 224–225 comments that '[t]he great rounded tower at Assos is [...] entered through an arched doorway, 2.05 m. wide and over 4 m. high at the centre (fig.36 [and 37]), and there are arched doorways of lesser height at Oenoanda. [...] But the normal means of covering the doorway to a tower was always a lintel (or if the span were very short, stone beams might be cantilevered from either side). A tendency to increase both the width and the height seems to have begun at least two generations before Philo, and the larger dimensions prevailed till the end of the Hellenistic age, except in towers that were intended merely for guard-posts and so placed that catapults would have been superfluous'.

On the general topic of defensive artillery in towers Marsden, *Development* chap.6, esp. 150–154, remains influential. Analytical surveys of relevant towers: J. Ober, 'Early artillery towers', *AJA* 91 (1987) 569–604; idem, 'Towards a typology of Greek artillery towers: the first and second generations (c.375–275 BC)', in van de Maele and Fossey, *Fortificationes Antiquae* 147–169; F.E. Winter, 'The use of artillery in fourth-century and Hellenistic towers', *EMC* 16 (1997) 247–292. Rihll, *Catapult* 136–139 (and her simultaneous but more technical 'On artillery towers and catapult sizes', *ABSA* 101 (2006) 379–383) offers a sceptical critique of the school of thought, represented nowadays principally by Ober and Winter (but tracing its ultimate origins to Schramm), which is predicated on the belief that one can calculate to a nicety the quantity and calibre of artillery that such towers – or, *mutatis mutandis*, curtains – could accommodate. (Add, in Winter's case, his article on Rhodes cited under A17 **Τινὰ δέ**, with its confident scenarios such as (199) '[t]he maximum "salvo" from the Perge gate-towers would have been two 20-mina balls plus two 4-span and four 3-span missiles, or perhaps one 10-mina and two 20-mina balls plus two 4-span and six 3-span bolts. The Rhodian tower, by contrast could have fired two 1-talent, one 40-mina and four 10-mina balls, plus two 4-span and six 3-span bolts, i.e. 200 minas of shot and eight missiles against 50 minas and five missiles'. There is more of the same in Winter's 1994 article 'Problems of tradition and innovation' (cited under that same lemma), at 34–42. As the issue is not directly relevant to Ph., who never attempts this sort of quantification himself, I will not pursue it here, except to comment that in my opinion Rihll's warnings are salutary. Such calculations tend to be too abstract, aimed at a game-like cramming of any given space, with a concomitant disregard of practical considerations such as the room taken up by ammunition.)

A26.1–2 [*81.37–38*] **τοὺς μὲν κατὰ τὰς εἰσαγωγὰς πύργους τῶν μηχανημάτων** ('those towers which must accommodate the deployments of (enemy) machines'). An ambiguous phrase, quite apart from its odd word-order. My understanding of it is the same as that of Rochas d'Aiglun and Graux 127, but contrast Lawrence 79: '(if they are meant) for installing engines'. Neither Diels-Schramm 24 ('an den für die Maschinen zugänglichen Stellen') nor Garlan 294 ('des secteurs accessible aux ouvrages de charpente') make it crystal-clear what they think is meant by Ph.'s κατά and εἰσαγωγαί, but probably they too are visualizing enemy 'machines', and that does seem the correct view to take (even without adopting Graux's emendation (126) of εἰσαγωγάς to προσαγωγάς, 'attacks'). To justify his heterodox one, Lawrence adopts his own emendation of μηχανήματων – which is otherwise, he himself insists, a way of referring to mobile siege-towers in the treatise – to μηχανῶν, a noun Ph. never uses.

A26.3–4 [*81.39–40*] **τοὺς δ' ἄλλους ὅσον κλίμακι <μὴ> προσικέσθαι** ('but the others as (tall as) not to be reached by a ladder'). If this is intended as any sort of quantification, it is not helpful. In any case, as accounts of sieges show, the sensible place for an attacking force to use ladders was almost always at a low stretch or stretches of curtain, not against a tower. (An extreme case is recounted by Plut. *Arat.* 18.7: that part of the Akrocorinth wall successfully escaladed by Achaians in 243 was 'no higher than fifteen feet'.)

For the idiom cf. already A12.2–3 [*80.26–27*] (minimum wall-height ἵνα αἱ πρὸς αὐτὸ κλίμακες προσαγόμεναι μὴ ἐξικνῶνται – which prompted Graux's suggested πρὸς <αὐτοὺς μὴ ἐξ>ικέσθαι in the present passage), and more generally Aesch. *Cho.* 1033, τόξωι γὰρ οὔτις πημάτων προσίξεται (where ἐφίξεται is an alternative reading).

A27.1 [*81.40*] **οἱ γὰρ ἄγαν ὑφηλοὶ κτλ** ('for ones which are too tall etc.'). Having made it clear that he wants both height and strength (ὑψηλοὺς καὶ ἰσχυρούς: A26.2–3 [*81.38–39*]) in towers against which 'machines' are likely to be brought, two disadvantages of excessive height – in any tower, presumably – are now mentioned. The first, that they 'are rather hard to use' (δυσχρηστότεροί εἰσιν: A27.1–2 [*81.40–41*]), employs the comparative degree of an adjective which Ph. has employed four times in *Bel.* (56.42, 57.40, 58.6, 59.42), alongside its cognate abstract noun δυσχρηστία (60.34, 76.41); nevertheless the essence of its practical meaning remains obscure without extra information. What would make a tower, in his view, either hard or easy to use? Since we are not told, we have to conjecture, and Garlan's comment (352 n.27*a*) is probably along the right lines: '[n]e serait-ce que parce que plus une tour est haute, plus son flanquement vertical s'avère difficile, en raison de l'accroissement de l'angle mort situé à son pied'. By contrast Ph.'s second worry is fully explicit: the vulnerability of tall towers to bombardment by heavy artillery (θᾶσσον ὑπὸ τῶν πετροβόλων τυπτόμενοι καταπίπτουσιν οὐ δυνάμενοι τὰ βάρη φέρειν: A27.2–4 [*81.41–43*]).

On the general point note Marsden, *Development* 150–151: '[o]ne of the first notable features [of the 'more advanced artillery towers' built from the late fourth century onwards: see already under A25 **Τοιαύτης**] is an increase in the thickness of tower walls. There are three possible reasons for this. First, the thicker walls may be designed to support towers of even greater height. [...] A second possibility is that the greater thickness was meant to provide not more height, but greater stabil-

ity, so that heavier artillery could be accommodated [i.e. used]. Thirdly, the stouter walls may represent an effort to build towers that would be more resistant to heavy stone shot. As far as the possible desire for greater height is concerned, the evidence of the existing remains of Greek fortifications, fragmentary at the best of times, seems by no means conclusive. But, if we judge from the relatively few powerful towers that still stand to a fair height, we find no positive indications that any tower ever possessed more than three superimposed chambers, where the floor of the lowest room lay at approximately the same level as the rampart walk. Thus, the maximum height of important towers apparently settled down at a figure of about 60 feet above external ground level. [...] The thickening of tower walls, then, was due to a combination of the other two possible reasons, greater stability and more substantial resistance to hostile shot'. See also McNicoll, *Fortifications* 9–10.

A28.1–2 [*81.43–44*] **σπουδαστέον ἐστὶν κτλ.** ('care is to be taken etc.'). The idiom reappears at A82.1 [*85.46*] (Σπουδαστέον δ' ἐστὶν κτλ), and see also C67.1–2 [*95.49–50*] (Πάντων δὲ μάλιστα δεῖ σπουδάζειν). The concept of *spoudê*, the zeal to expend effort in a worthy cause, is prominent in the language of public approbation and reward: see further at A83 under **Περὶ οὖν**.

A28.2–4 [*81.44–46*] **τὴν εἰς τὰ ὕψη δαπάνην γινομένην εἰς ταῦτα ἀναλίσκειν** ('to spend on these (thicknesses) the cost (that would have been incurred) on the heights'). Graux considered that the supplement <μὴ> γινομένην was needed to produce this sense, but no-one has agreed with him.

For a financial consideration of this kind cf. above, under A19 **τό τε ἀνάλωμα**.

A29 [81.47–82.2]: rough-faced masonry

A29.3–4 [*81.49–50*] **λίθοι ὡς σκληρότατοι ἐκτίθενται προέχοντες ὅσον σπιθαμήν** ('stones as hard as possible are placed forward – protruding as much as a span (23.1 cm.)'). This recommendation as a whole, for bossing, elaborates the one fleetingly given in A11.4–6 [*80.22–24*]: μάλιστα μὲν ἐκ κραταίου λίθου ... εἰ δὲ μή, ὀξεῖς. As a principle, it could of course be adopted in a more rough-and-ready manner than the one Ph. advocates here; cf. Rihll, *Catapult* 162 ('natural bossing, stones bulging out in their centers'), with Asine as an example; and see also below, under A31 **καὶ λίθοι**.

A29.4–6 [*81.50–82.1*] **διεστηκότες ἀπ' ἀλλήλων τοσοῦτον ὥστε εἰς τὴν ἀνὰ μέσον χώραν ταλαντιαῖον πετροβόλον μὴ παραδέχεσθαι** ('separated from each other by such a distance that into the intervening space (a shot from) a one-talent (26 kg.) rock-projector does not penetrate'). After several general allusions to such enemy artillery, Ph. now specifies a weapon of a particular calibre. A one-talent petrobolos is mentioned again in A70–71 [*84.47–85.4*] and A73 [*85.6–13*] (and that same weight of stone, simply dropped on attackers, in C10.4–6 [*91.36–38*]). Real-life instances include Demetrius Poliorcetes at Rhodes (Diod.Sic. 20.87.1), Philip V at Echinos (Plb. 9.41.8), and Vespasian at Iotapata (Joseph. *BJ* 3.167).

The implication, here, that the one-talent size was the one that wall-builders in this era needed to take into particular account is repeated in A73.3–4 [*85.8–9*], with the phrase ὁ ταλαντιαῖος πετρόβολος, ὅς ἐστι σφοδρότατος. Most scholars – e.g. Marsden, *Development* 90; Garlan 299; Lawrence 85; Rihll, *Catapult* 162 – construe this parenthetical addendum to mean 'the most powerful'. Since Ph. did not write ὁ σφοδρότατος I believe that his superlative means 'very powerful', but either way we are probably entitled to conclude that the one-talent size was the most formidable likely to be encountered in the field. (Evidence of larger sizes, nevertheless, does exist, not merely in theoretical handbooks such as Ph.'s own, which lists summary specifications for a range between ten minas and three talents [*Bel.* 51.34–44, with Marsden, *Treatises* 158], but also and especially in the archaeological survival of actual "shot", the stone balls fired from these machines. Balls weighing four talents or more are deemed unlikely to have been intended for artillery proper, but anything up to a three-talent size could have been. See further Marsden, *Development* 79–83; D.B. Campbell, *Greek and Roman Artillery 399 BC – AD 363* (Botley [Oxford] 2003) 18–22.)

The one-talent balls mentioned by Ph. here would have had a diameter of about 25 cm. (Diels-Schramm 25 fig.8; Lawrence 78), which gives a broad idea of the three-dimensional spacing between the bosses – no more than c.22 cm. cubed – that he had in mind. See on this Rihll, *Catapult* 161–162, with (at her fig.7.4) an instance of such regular bossing on the top floor (immediately below, and to the right and left of, a square window) of the south-east corner tower at Paestum (Adam, *L'architecture* 245–247; the full-page photograph at his 247 is the original of Rihll's figure).

A30 [82.2–5]: suiting wall-traces to terrain

This topic, briefly introduced here, is elaborated in A84–85 [*86.3–13*].

A30.2 [*82.3*] **αἱ ἐκθέσεις καὶ ἐγκλίσεις** ('the salients and re-entrants'). Ph. here uses two nouns which each have other meanings in other contexts, but as applied to the line of a wall they can hardly be translated other than with their present-day architectural equivalents. LSJ s.v. ἔκθεσις VII notes this 'salient' sense, also attested in the phrase κατὰ τῶν πύργων τὰς ἐχθέσεις (*sic*) in an early-third-century wall-building contract from Ephesos (SGDI 5597; Maier no.71), lines 6–7. The 're-entrant' sense of ἔγκλισις is overlooked by LSJ but must be correct here. (For another sense of it, in arch-building, see B21.1–3 [*87.40–42*].)

A30.2–3 [*82.3–4*] **τὰ ἐπικάμπια** ('the jogs'). See under A9 **Τὰ δὲ μεταπύργια**, on ἐπικαμπίους ... τοίχους there. The substantive, in the present passage, cognate with that adjective was deemed unclear in its application by Garlan 341 n.9*a*; however, enlightenment seems now to be provided by the Skotoussa wall-survey inscription (SEG 43.311: **Appendix 4**). The commissioners' report there includes five mentions of an ἐπικάμπιον (II.23, 24, 36 (twice) and 73), three of which relate it to a curtain.

The publisher of the document, V. Missailidou-Despotidou, discusses this topic on p.211 of her article, where *inter alia* she cites and rejects the 'roofed chamber' concept of F. E. Winter (see under A9 **Τὰ δὲ μεταπύργια**) and briefly argues instead – with acknowledgement to J. J. Coulton – for ἐπικάμπια as, in effect, jogs: short stretches of wall at right angles to the main line; what Hdt. 1.180.2, writing of the walls of Babylon, calls ἐπικαμπαί. Oddly, as regards Ph. she adduces A9 [*80.11–16*] but not the present passage, where that sense seems even more plausible.

A30.3 [*82.4*] **αἱ <εὐθυω>ρίαι** ('the straight-line sections'). This is Garlan's suggestion (294) for the apparent lacuna in the manuscript transmission. Only P has a complete noun, αἱ χρείαι, and the only sense appropriate to it in this context – 'utilities, such as gateways and posterns' (Lawrence 70) – might be too much of a semantic stretch. Mss VE have αἱ …ρίαι, with a later hand in E filling the lacuna with εὐρυχω; some later manuscripts also have εὐρυχωρίαι. Schoene printed the lacuna, Diels-Schramm 25 <εὐρυχω>ρίαι. Why 'open spaces' would deserve a mention here is unclear, however; and Garlan's <εὐθυω>ρίαι provides the contrast with τὰ ἐπικάμπια that seems desirable, as he comments, if a second pair of opposites comes after αἱ ἐκθέσεις and αἱ ἐγκλίσεις. For general parallels see: Syll.^{3} 421.45–48 (on face B: border-adjudication between Oiniadai and Matropolis, Akarnania, c.268: ὅρια τᾶς χώ|ρας Οἰνιάδαις ποτὶ Ματροπολίταις τὸ δια|τείχισμα καὶ ἀπὸ τοῦ διατειχίσματος εὐθυωρίαι διὰ τοῦ ἕλεος εἰς θάλασσαν) and Syll.^{3} 685.63–65 (arbitration between Itanos and Hierapytna, Crete, 139: καὶ εὐθυ|ωρίᾳ ἐς Δορθάννας ἐπὶ τὸν λάκκον καὶ ὡς ἀ ὁ[δὸς] ποτὶ μεσανβρίαν τᾶς ὁδῶ τᾶς ἀγώσας δι' Ἀτρῶνα καὶ ἐς | Μόλλον καὶ ἀπὸ Μόλλω εὐθυωρίαι ἐπὶ θάλασσαν).

A31 [82.5–6] (misplaced): rough-faced masonry, resumed

A31.1–2 [*82.5–6*] **<…> καὶ λίθοι ἀργομέτωποι πεπελεκημένοι ἐπὶ μῆκος τίθενται** ('<…> and stones with rough-hewn faces cut by axe are placed lengthways'). Diels-Schramm 25 declare these seven words a 'zusammenhangloses Exzerpt' but nonetheless keep it here, marking a lacuna beforehand. I have followed Garlan 295 in agreeing with this, though the temptation to find a better context is strong. Rochas d'Aiglun's transposition to the end of A29 [*81.47–82.2*] is noted (but not followed) by Lawrence 78. Graux 128 effected one which places the material earlier in that chapter, immediately before λίθοι <δ'> ὡς σκληρότατοι κτλ (with the iterated λίθοι causing the omission).

The adjective ἀργομέτωπος is unparalleled in other literary sources but does occur, in a fragmentary context, at lines 40–41 of IG ii^2 463, the Athenian wall-repairing decree of 307/6 (see under A14 **κατάστεγα**). For stones 'cut by axe' cf. e.g. Maier no.10 (IG ii^2 244, now ii^3 429; Schwenk no.3; translation in AIO), repairs to Athenian Long Walls and Peiraieus walls 337/6, lines 51–52; SEG 4.446 (accounts of the curators of Apollo of Didyma, late third or early second century), lines 17–22.

The phrase ἐπὶ μῆκος τίθενται expresses more plainly what A11.3 [*80.21*] and A20.2 [*81.7*] have called *lithoi orthioi*; cf. under A11 **τιθέντας**.

A32 [82.6–14]: extramural artillery

A32.1–2 [*82.6–7*] **κάτωθεν τῶν τείχων καὶ τῶν προτειχισμάτων** ('beneath the walls and the outworks'). This is the first mention of such outworks, but see further at A54.1–2 [*83.44–45*], A60.3–5 [*84.10–12*], A68 [*84.39–42*], A74.4–7 [*85.16–19*], A75 [*85.19–21*], A82–83 [*85.46–86.2*], C7.1–4 [*91.19–22*], C44 [*94.13–20*] and D55 [*100.39–44*]. A rather different use of the same noun, *proteichisma*, occurs in C33 [*93.29–32*]; see the Comm. thereto.

Ph.'s general principle is illustrated, as Garlan 353 n.32*a* notes, by what Plutarch records of Archimedes, during the Romans' siege of Syracuse in 213–211, preparing most of his defensive artillery ὑπὸ τοῦ τείχους (Plut. *Marc.* 16.2). The Loeb translator, B. Perrin, understands this ὑπό as 'close behind', and as regards the present passage of Ph. Graux 128 took the same view ('au pied *et en arrière*': his emphasis), but Garlan makes the opposite supposition about Archimedes: 'probablement à l'extérieur de la ville, entre la muraille et les avant-murs'. See also for this Marsden, *Development* 116–121 (a general analysis of the advantages and disadvantages of situating defensive artillery elsewhere than in towers or on walls), at 117.

A32.3 [*82.8*] **βελοστάσεις** ('artillery-emplacements'). See already under A21 **ἐν οἷς αἱ βελοστάσεις**.

Lawrence 277 comments: '[a]t all cities where a *proteichisma* existed, whether it bordered a ditch or stood independent, emplacements for catapults […] may have been dispersed along the strip of gently or steeply rising ground between it and the wall. Philo's instructions on this matter [in A32] are so condensed that they would have been incomprehensible to his first readers unless the practice were already familiar, as he evidently presumed; it might, in fact, have originated a century earlier'. Here again (cf. A21 under **συνεργοῦντες**) Lawrence's reasoning ignores the epitomization of Ph. In any event see further under the next three lemmata.

A32.4 [*82.9*] **αἱ μὲν [ὀρυκταὶ] ἐπίπεδοι [καὶ κατώρυχοι]** ('some at ground-level'). Most scholars have objected to a superfluity of descriptors in the transmitted text. Graux 128 wanted to eliminate ἐπίπεδοι καὶ κατώρυχοι. Schoene (followed by Diels-Schramm 25 and Garlan 295) has what is printed here, which keeps ἐπίπεδοι but jettisons ὀρυκταί. (Lawrence 79 retains everything, i.e. a distinction, within the ground-level category of emplacements, between ones quarried into hard rock and ones embedded in earth.)

A32.4–5 [*82.9–10*] **αἱ δὲ ὑπόγειοι, κτλ** ('others below ground, etc.'). The amount of space devoted to the purposes and virtues of this mode of installation, which takes up the rest of this long sentence, probably reveals it as innovatory, whether on the part of Ph. or someone else. Be that as it may, one would have wished to know *how far* below ground he envisaged these 'catapulteers' doing their work. Lawrence 277–278 addresses the issue as follows: Ph. 'requires some emplacements to be level with the surface of the ground, others below it – but gives no overt advice on the depth to which they should be sunk. A clue can, however, be derived from the

value he attaches to having some catapults still able to command an enemy force that has advanced so near that others are bound to overshoot [see the next lemma]. We must remember, in the case of the emplacements at ground level, that the missiles were actually discharged well above it, from the top of the catapult. If the catapult stood with its mount sunken and only the top protruding, they could be discharged practically from ground level; on the lowest trajectory that would clear the *proteichisma* they might strike almost horizontally, thereby doing maximum execution. If the entire catapult were below the surface, it would needs be tilted upwards to shoot at a steep trajectory, ending with a steep descent; this cannot have been much in request, because the sole motive for placing catapults behind a *proteichisma* was certainly to have missiles strike at an angle unattainable off the wall.

The phrase πρὸς τὸ εὐρυχωρίαν ἔχειν πολλήν ('with a view to having plenty of space') echoes, presumably unconsciously, one used in a quite different context: Demosth. 19.272 on the spaciousness of the Athenian akropolis, ὅλης οὔσης ἱερᾶς τῆς ἀκροπόλεως ταυτησὶ καὶ πολλὴν εὐρυχωρίαν ἔχειν.

A32.8–9 [*82.13–14*] **τοὺς καταπελταφέτας** ('the catapulteers'). In Ph. – including *Bel.* – the term occurs only here, but cf. under Suda κ 699. Otherwise, whether in this *-pelt-* or more usually *-palt-* form, surviving attestations are all furnished by epigraphy, both public and private. In Athenian honorific decrees of the third century and later a *katapaltaphetēs*, when honoured, is a man who had instructed ephebes in his skills: so e.g. in IG ii² 665 (Syll.³ 385), 900, 944 (now ii³ 1229A), 1006, 1008, 1009, 1011, 1028; cf. Garlan 218. Documents of other kinds: Syll.³ 958 (third-century law from Koresia, Keos, prescribing *inter alia* the prizes for festival victors including the men's catapult contest, καταπαλταφέτηι ἀνδρί [cf. generally Syll.³ 1061.8, from second-century Samos]), with Garlan 218 and Rihll, *Catapult* 97–98; IG ii² 9979 (Syll.³ 1249, mid-fourth-century Athenian gravestone of Ἡρα[κ]λείδ[α]ς | Μυσός | κατ[α]παλταφέτας), with Marsden, *Development* 67–68, and Garlan 172.

A32.9 [*82.14*] **ἀδυνατοῦντας καταστρέφειν** ('by being unable to lower their aim'). An unusual, but intelligible, use of the verb καταστρέφειν. (Graux at one time favoured emendation to περιστρέφειν, 'to rotate', but later abandoned the idea.) It is translated less specifically by Rochas d'Aiglun ('converser') and Diels-Schramm 25 ('wenden'), but in the circumstances the force of κατα- can appropriately be brought out; cf. Graux 131 ('abaisser suffisamment leur tir'), Garlan 295 ('baisser leur armes'), Lawrence 79 ('to train (their weapons) low enough'), Marsden, *Development* 117 ('to depress their engines'), and B. Campbell, *Military Writers* no.220 ('to lower the angle of fire').

A33–35 [82.14–27]: posterns and sorties

A33.1–2 [*82.14–15*] **πυλίδες πολλαὶ καταλείονται ἐκ τῶν πλαγίων** ('numerous posterns are left (issuing) out of the flanks'). On posterns, a.k.a. sally-ports, see already under A9 **τὰς πυλίδας**. Ph.'s most striking ideas about them come here, in

A33–35 [*82.14–27*], in particular his wish that their configurations, of two (implicitly paired) kinds, will always allow troops leaving the city on sortie to come and go with their unshielded right sides protected from the enemy. See further under the next lemma.

Garlan 353–354 n.33*a* claims an extreme rarity of sites where this exacting stipulation is exactly met. The only certain instance he recognizes, in fact, is the (probably late-third-century) 'land wall' at Iasos, Caria, with its 68 different posterns. (See also on this Winter *Fortifications* 241–242; Lawrence 80, 184 fig.33, 338, 353–355, 426; Adam, *L'architecture* 93 with n.93, 97 ph.125 and fig.65; Milner in McNicoll, *Fortifications* 214.) However, Garlan does concede that some schemes approximating more generally to Ph.'s criteria have been assembled by Winter, *Fortifications* 234–251. Relevant sites discussed by Winter there include Mantineia and Stratos (Akarnania). See also Lawrence 335–342, at 339–340, on Cyrenaic Apollonia (later Sozousa), Dura-Europos, Ephesos and Miletos.

A33.5 [*82.18*] **τὸν … λόχον** ('the contingent'). Ph.'s only use of this noun. As LSJ s.v. shows, its applications, when not referring specifically to ambushes, embrace both informally- and formally-constituted bodies of troops. There is no basis for determining under which of those heads the present instance falls, but cf. any event Aen. Tact. 1.5 (μερίσαντα λοχίσαι, ἵνα εἴς τε τὰς ἐξόδους καὶ τὰς κατὰ πόλιν περιοδίας … ὑπάρχωσιν) and 15.1–4. On *lochos* in Aen.Tact. see generally Whitehead, *Aineias* 100–101; Bettalli, *Enea* 216.

A34.1–2 [*82.21–22*] **αἱ μὲν σκολιαί, αἱ δὲ κλῖσιν ποιοῦνται** ('some are oblique, others make an angle'). All the manuscripts have κλεῖσιν, 'closure,' in the second of these phrases. Rochas d'Aiglun expanded κλεῖσιν ποιοῦνται into 'avec des portes fermant au verrou', and his note (partially reproduced by Garlan 354 n.34*a*) envisages the closable posterns as the ones for leaving from the right-hand sides of the towers, while re-entry is effected through ones on the left-hand sides, having an open but narrow and bent passage. Graux 130, unhappy (one must assume) with a category of posterns which lacked a 'closure', printed the emendation to κλίσιν that is now standard. In the modern era only Lawrence 80 (having evidently abandoned earlier views privately communicated to F.E. Winter: see Winter, *Fortifications* 244 n.30) has retained κλεῖσιν, objecting that a change to κλίσιν removes any discernible difference between Ph.'s two types of postern; his phrases become, on the contrary, all but tautological. Yet if Ph. did describe some of them as *skoliai* and other as having a *klisis*, the onus falls on us to understand and translate those terms in a way which encapsulates a substantive differentiation in design. Garlan 355 notes the one made by Diels-Schramm 26 – αἱ μέν are 'gekrümmt', αἱ δέ 'geneigt' – but his own phraseology (borrowed from Graux), which I have followed here, reverses those two descriptions. See his fig.51 for an instance of the (straight but) oblique kind (the harbour gate at Oiniadai, Akarnania) and fig.52 for the second (Zarax, east coast of Lakonia). Winter, *Fortifications* 244–245 (with further instances) puts the matter thus: the *skoliai* ones 'passed through the wall at an oblique angle', the ones with a *klisis* 'were either L- or Z-shaped'.

A35.1–2 [*82.22–23*] **Πρὸ πασῶν δὲ αὐτῶν οἰκοδομήματα κατασκευάζεται** ('In front of them all, built structures are prepared'). A frustratingly vague noun. Ph. will resort to it again in B15.3 [*87.23*], B19.2 [*87.33*] and B29.1 [*88.16*], but there his topic is a specific one (granaries) which imposes its own degree of precision. Here in A35 that is not the case. Nevertheless Garlan 355 n.35*a* reasonably comments that here the term must include the jog walls already mentioned in A9 [*80.11–16*], and Lawrence 80 adds the items that will be mentioned in A67–68 [*84.36–42*].

A35.2–3 [*82.23–24*] **ἵνα δυσέμπρηστοί τε ὦσι** ('in order that they may be difficult to set on fire'). This is the first of four reasons summarily given for protecting the posterns. The adjective δυσέμπρηστος, not found outside Ph., reappears in C3.4 [*91.6*], in a parenthetical phrase there which has been suspected, probably wrongly, of being an intrusive gloss: see the Comm. thereto. In any event, the topic of fire and its hazards – for either side – does come up again many times: cf. B53.7–9 [*90.20–22*], C12 [*91.40–43*], C14.8–10 [*92.3–5*], C39–41 [*94.1–10*], C44 [*94.13–20*], C55–58 [*95.5–20*], D34–35 [*99.21–28*], D41 [*99.48–51*], D49 [*100.20–22*] and D104 [*104.19–21*]. (B20 [*87.37–40*] is not about siege-warfare but the everyday problems of wooden components in buildings.)

A35.5–6 [*82.26–27*] **ἐκ δὲ τῆς πόλεως ὅταν μέλλωσιν ἐπεξιέναι τινές, μὴ συμφανὲς ᾖ τοῖς πολεμίοις** ('and when some (of the defenders) are intending to make a sortie out of the city, (this) would not be obvious to the enemy'). For impersonal συμφανές, an adjective most common in philosophical and other abstract writings, cf. already *Bel*. 60.16–17. Its use in quasi-narrative contexts like the present one can also be found elsewhere, such as Diod.Sic. 13.99.5 (τὸ περὶ τὸν ναύαρχον ἐλάττωμα συμφανὲς ἐγένετο, referring to the defeat and death of the Spartan admiral Callicratidas at the battle of Arginusae in 406). By contrast a passage like Plb. 2.25.5 employs a personal idiom (ἅμα τῷ φωτὶ συμφανεῖς γενομένους τοῖς πολεμίοις) that might have been more natural here too.

A36–38 [82.28–42]: trenches and palisades

A36.1 [*82.28*] **Αἱ δὲ ὀρυττόμεναι τάφροι** ('Trenches being dug'). On trenching see already A10 [*80.16–19*], where (as again at C32 [*93.25–29*]) it concerns defensive trenching *inside the city*. Here in A36–38 [*82.28–42*], by contrast, what we have is an anticipatory airing of the topic fully expounded in A69–78 [*84.43–85.35*]: the system of concentric trenches (etc.) which Ph. wants the enemy to encounter before they even reach the walls. (C7 [*91.19–24*] describes something more reactive.) The proviso 'unless the site is subject to inundation (ὕπομβρος)' is entered again at D10.9 [*97.27*], on digging from the attackers' perspective.

Note generally Winter, *Fortifications* 273 (expanded 329–331) on the three-lines-of-defence doctrine – or four, if bombardment is counted separately – of the Hellenistic era. The enemy will first encounter one or more trenches, with their associated outworks and artillery; secondly there will be sallies and sorties in force (A33–35 [*82.14–27*], A81 [*85.41–46*]); and only as the third line comes the city wall. (*Fortifications* 283–286 seeks to trace a broader line of development in this regard from the mid-fourth to the early first century.) Likewise in brief Milner in McNicoll, *Fortifications* 215.

A36.2 [*82.29*] **ὑπόνομοι** ('served by tunnels'). This is indeed the sense of the adjective ὑπόνομος needed here: not 'underground' (LSJ s.v.2, as in e.g. the ὑπονόμους τάφρους of App. *BC* 4.13, which are sewers) but 'undermined' (LSJ s.v.1) – in a good way, served by tunnels giving access to and from the town. (Thuc. 2.76.2 uses ὑπόνομος as a masculine noun to describe precisely that, as contrived, impromptu, by the defenders of Plataiai in 429, and cf. also e.g. App. *Mith.* 324 & 382, Polyaen. 8.21, Plut. *Cam*. 5.6 and (metaphorical) *Caes*. 6.6. In Diod.Sic. 20.94.1 on Rhodes they are feminine ὑπονομαί.)

The "Archimedean", late-third-century phase of the Euryalos fortress at Syracuse – see generally at A69 **Ὀρυκτέαι** – illustrates the same principle but as a permanent installation: Garlan 355–356 n.36*a* (and cf. more broadly Marsden, *Development* 119).

A36.4 [*82.31*] **τὰ μὲν ἡμέρας τὰ δὲ νυκτός** ('some during the day and others at night'). Thus the manuscript tradition, which like Schoene and Garlan 295 (and Lawrence 81) I find unexceptionable. Graux's suggested deletion of τὰ μέν and τὰ δέ, followed in Diels-Schramm 26, creates a different scenario: everything thrown in by the besiegers during the day is removed by the besieged at night. Graux 132 claimed support for this in a passage of Dexippus (now FGrH 100 F27.11), on the third-century-CE siege of Philippopolis, where the attacking Thracians do use the cover of night to remove the earth from a tunnel they are excavating; but Garlan 356 n.36*a* reasonably comments that the sort of thing Ph. is describing offers better conditions for such work (by the besieged, in his case) at any time.

A37.1–2 [*82.32–33*] **Αἱ δὲ χαρακώσεις** ('The palisadings'). This procedure – expressed variously by the nouns χαράκωσις, as here, and (more usually) χάραξ, together with the associated compound verbs ἀποχαρακοῦν and περιχαρακοῦν – will feature prominently Ph.'s thinking from now on, as something to be undertaken alike by defenders (A37–38 [*82.32–42*], A54.3–4 [*83.46–47*], A68 [*84.39–42*], A74–75 [*85.13–21*], A81–83 [*85.41–86.2*], B52.3 [*90.10*], C33 [*93.29–32*] and C51 [*94.36–40*]) and by attackers (D5–6 [*96.37–49*], D10.1–4 [*97.19–22*], (?)D50 [*100.22–25*], D84 [*103.4–8*], D88–89 [*103.19–28*] and D99.5–6 [*103.49–50*]). Beyond assuming, here, that the stakes are secured in place by cords – see below under **ὑπὸ τῶν γινομένων** – Ph. discloses no details about its character and construction; on that, the *locus classicus* is a digression in Plb. 18.18.2–18 (taken over by Liv. 33.5.5–12) comparing the Greek and Roman types, the latter in his view far superior.

The words which immediately follow Αἱ δὲ χαρακώσεις are transmitted as ἔξω τῆς πρὸς τὸ τείχισμα λαμβανούσης. This paradosis was deemed satisfactory by Schoene, though one cannot tell how he would have translated it. (Rochas d'Aiglun's translation, supplying ἀρχήν after λαμβανούσης, is 'excepté ceux qui sont plantés devant un épaulement'. Graux 133, with greater exactitude (and no supple-

ment), proffered 'excepté celui qui entoure l'avant-mur'.) I have followed Garlan 295 in accepting (from Diels-Schramm 26) ἔξω τῆς <τάφρου τῆς> προσ<εχῶς τὴν παρέκτασιν παρὰ> τὸ τείχισμα λαμβανούσης, which *inter alia* understands ἔξω as 'outside' (rather than 'except', as in B4.1 [*86.35*], ἤπατα ἔξω τῶν ὑείων). The resulting phrase, 'outside the <trench which> has <its extension along> the rampart', refers to the innermost of the three trenches that will be recommended in A69 [*84.43–47*]. Shortly afterwards, between ὄρθιαι πᾶσαι συντελοῦνται παρά and πρὸς> τὸ κτλ., further detail (on height and construction: Schoene) seems to have been lost.

A37.3–4 [*82.34–35*] **πρὸς> τὸ χάρακα δυσυπέρβατον καὶ δυσδιάσπαστον γενέσθαι** ('with a view to> the palisade being difficult to cross and difficult to uproot'). Both of these adjectives are repeated, as a modest stylistic flourish, to begin the two explanations appended: A37.5–6 [*82.36–37*] and A37.6–10 [*82.37–41*] respectively. The first of them is a *hapax legomenon*, the second otherwise attested only in Plb. 15.15.7 (where it is applied figuratively to the sturdiness of the Roman battle-order faced, over the years, by Hannibal).

A37.5–6 [*82.36–37*] **διὰ τὸ μηδαμῶς [μήτε] ὑπέρβασιν ἔχειν τοῖς σκέλεσι** ('because it has in no way a crossing for the legs'). This phrase as it stands has an otiose μήτε; I have followed Garlan 295 in simply deleting it, as a scribal error caused by μηδαμῶς. The older alternative is to keep it with a lacuna immediately following (Graux, Schoene), which Diels-Schramm 27 fill with μήτε <κλίμαξιν μήτε>.

This sense of the noun ὑπέρβασις is hard to parallel exactly, but cf. Plb. 4.19.8 (τὴν ὑπέρβασιν τῶν λέμβων) and numerous instances in Strabo (beginning with 2.1.11) of this as a geographical span.

A37.7–8 [*82.38–39*] **ὑπὸ τῶν γινομένων τοῖς καλῳδίοις ἐνάψεων** ('because of the attachments made with cords'). The noun ἔναψις is attested only by two instances in Ph. In D23.3 [*98.33*] it refers to part of anchors, a term explicit there; but as used absolutely in the present passage its sense must be, in effect, knots ('as a result of the fastenings being knotted': Lawrence 81).

For καλῳδία see also C9 [*91.28–33*], C66 [*95.44–49*], D75.1–3 [*102.23–25*], and elsewhere e.g. Thuc. 4.26.8, Aristoph. *Vesp.* 379, IG ii^2 1632.3–4, 1648.13. While it is true that 'the wider use of καλῴδιον in [*sc.* post-classical] historical and poliorcetic literature reveals generic ropes or cables with no actual diminutive sense' (P. Rance in *BMCR* 2015.06.15), I am satisfied that 'cord' is the appropriate translation in all these passages of Ph.

The aim of making the *charax* 'difficult to uproot' pre-emptively addresses Polybius's concern (above, under **Αἱ δὲ χαρακώσεις**) that palisades of the Greek kind are in fact easy to uproot. Ph.'s confidence that knotted cords will counteract this is tempered, curiously, by an acknowledgement that in practice the cords might break.

Episodes in which a palisade is broken through/torn down (the standard verb used, in the instances given here and also elsewhere, is διασπᾶν) include: Xen. *Hell.*4.4.10 on faction-fighting at Corinth in 392; Arr. *Anab.* 1.8.1 (with HCA 1.80–

81) on Perdiccas's troops at the Theban Cadmeia in 335; Arr. *Anab.* 2.19.5 on the Tyrians counter-attacking against Alexander in 332; Diod.Sic. 18.34.2 on Perdiccas vs. Ptolemy at an Egyptian desert fort in 321; Plb. 3.102.4 on M. Minucius Rufus at a Carthaginian camp in Apulia in 217.

A38.1–2 [*82.41–42*] **Τίθενται δὲ [καὶ] εἰς τὸ στάδιον οἱ μέσοι τοῖς μεγέθεσιν ὄντες χάρακες ,αχ΄** ('Positioned per stade (184.8 m.) are 1600 pales of medium sizes'). For the stade (στάδιον) see again at B53.3–4 [*90.16–17*].

In the present context, specification of the 'sizes' of the pales evidently refers to their girth rather than their height; the allocation is roughly one every 11.5 cm. If the number 1600 is correctly transmitted, it is less likely to be the result of a calculation per foot (and awkward as such: there were 600 feet in a stade) than a pragmatic recognition of the actual girth of stakes available in sufficient quantity.

Amassing stakes in large quantities and of adequately uniform dimension was normally done in a more routine manner, we may be sure, than the politically-driven one adopted by Dion in his fencing-off of the Syracusan akropolis (the refuge of his opponent Dionysius II) in 356: each citizen cut and contributed a single *stauros* apiece (Plut. *Dion* 48.2). Diod.Sic. 18.70.2 on Megalopolis preparing for Polyperchon's attack in 318 mentions what must have been a more routine procedure in this regard: a subset of the 15,000 effectives was detailed to bring in ἀπὸ τῆς χώρας χάρακα.

A39–43 [82.43–83.7]: the wall-trace in semicircles

A39.1–2 [*82.43–44*] **Ἑτέρα δέ τις ἐστὶν πυργοποιία ταύτης οὐθὲν χείρων** ('There is another fortification-system, not inferior to this'). On πυργοποιία (again A85.2 [*86.12*], A87.2 [*86.19*] and B23.1–2 [*87.47–48*]) as a synonym for τειχοποιία see Introduction at nn.55–56.

Here begins a description (A39–43 [*82.43–83.7*]) of a wall-trace 'comprised out of semicircles' (ἐκ τῶν ἡμικυκλίων συνισταμένη: see the next lemma); then follow a serrated one (A44 [*83.7–14*]), a "double" one (A45–54 [*83.15–47*]), one with slanting curtains (A55–58 [*83.47–84.5*]), and an allusion to 'old' arrangements, as, in part at least, in Rhodes (A59–68 [*84.5–42*]). So what is A39's 'this' (ταύτης), the system to which the semicircle one is 'not inferior'? A84 [*86.3–11*] appears to supply the answer, in its summary listing of six types of wall-trace in all, and their suitability to different kinds of terrain. Nos.2–6 there are the ones I have listed here, and they are preceded there by mention of the 'meandering' trace, ἡ μὲν μαιανδρώδης (A84.3 [*86.5*]); see Comm. thereto on the sense and implications of the term.

Where then does the discussion of this trace – the original version of which, we may suspect, contained either Ph.'s adjective μαιανδρώδης itself or at least a periphrasis of it – begin?

Lawrence 73 goes too far in bringing *everything* presented in the treatise so far (A1–38 [*79.1–82.42*]) under that head. That the topic starts no later than A25 [*81.34–37*] appears to be a possibility, given the phrase Τοιαύτης δ' οὔσης τῆς τειχοποιίας there (A25.1 [*81.34*]); however, A30 [*82.2–5*] subsequently confuses

the issue again by beginning with a point applicable to 'all' walls, Τῶν δὲ τειχέων ἁπάντων. Thus, even if one is prepared to accept that the meandering trace received a considerably fuller coverage than any of the five others, it still seems to be the case that treatment of it is interrupted (in the transmitted version) at least once, perhaps several times, by other material.

The assertion of Garlan 361 n.59*a* that the entirety of A1–38 describes, rather, the 'old' or normal system (before turning to the various new(er) ones) must rest on what he regards as the connection between A59 [*84.5–7*] and A17 [*80.45–49*], but on that see already above under A17 **Τινὰ δέ**.

A39.2 [*82.44*] **ἐκ τῶν ἡμικυκλίων συνισταμένη** ('comprised out of semicircles'). Already hinted at in A7 [*79.26–80.5*]; see the Comm to **τετραγώνους** there. The addition now of 'such that their hollows face the enemy', ὡς τὰ κοῖλα πρὸς τοὺς πολεμίους φαίνεσθαι (ὡς for the transmitted καί retained by Schoene: Buecheler ap. Schoene, now standard), guarantees that the concavities of the wall-trace are outward-facing; see Diels-Schramm 27 fig.9, Garlan 357 fig.53, and McNicoll, *Fortifications* Glossary ('semicircular trace: Philon's term for curtains describing re-entrant semicircles between salient towers').

Lawrence 80 comments that 'since genuinely semicircular re-entrants could not fit all irregularities of terrain, [Ph.] presumably requires the wall to describe any arc of a circle deep enough to counteract the tendency to slip forward'. McNicoll, *Fortifications* 12 comments that '[c]osts must have been enormous', and finds the closest surviving analogy – not a very close one, it must be said – in Asia Minor, at Side, 'where the curtains are set back from the towers and connected to them by subsidiary walls'. And see further under A84 **ἡ δὲ ἐκ τῶν ἡμικυκλίων**.

What Ph. chooses to call a semicircle stands obvious comparison with the sort of 'crescent-shaped' (μηνοειδές) construction – a lunette – mentioned in several siege-narratives, as an expedient resorted to by the defenders when part of their wall proper has fallen or is likely to fall. For this see e.g. Thuc. 2.76.3 (Plataiai, 429); Arr. *Anab.* 1.21.4, with HCA 1.146 (Halikarnassos, 334); Diod.Sic. 20.97.4 (Rhodes, 305–4).

A40.3–6 [*82.47–50*] **ὥστε ἀπαρτίζειν ταῖς γωνίαις αὐτῶν καὶ λαμβάνειν ἀπ᾽ ἀλλήλων διάστημα τῆς ἔξω περιφερείας ὅσον ἂν ᾖ τὸ πλάτος τοῦ ἔσω τοίχου τῆς βάσεως** ('in such a way as to make a fit onto their corners and to create between one another an interval in the outer curvature equal to whatever may be the breadth of the internal side of the (tower's) back'). An obscure passage, on which neither Diels-Schramm nor Garlan venture any comment. That of Lawrence 80 – 'the curtains *overlap* the rear corners by a distance equal to the thickness of the back-wall, and so are more securely attached' (my emphasis) – requires διάστημα to mean the opposite of what it normally means (in Ph. and elsewhere). Rochas d'Aiglun and Graux 135 understand the provision in a way which does allow διάστημα a conventional sense but perhaps at too high a price: as their shared diagram shows, the semicircles of curtain themselves are tiny, because each has the same distance from one extremity to another as the corresponding distance across the inside of one of the intervening towers.

A41.1–2 [*82.50–51*] **Ἁπάντων δὲ τοὺς δόκους ἐπὶ τοὺς ὀρθοὺς τοίχους ἐπιθετέον ἐστίν** ('The joists of all (towers) are to be positioned on the(ir) forward-leading sides'). Graux posited a lacuna after Ἁπάντων δέ. For Schoene (and tacitly his successors) it was enough to say that τῶν πύργων is implicit.

Given the explanation provided (ἵνα κτλ), this must be a second passage where *orthos* adopts the perspective of someone looking along the line of the wall – as a guard would patrol – rather than out from it. (Graux 134 perceives the link between A17.4–5 [*80.48–49*] and the present passage in this regard; Garlan 348 n.17*e*, oddly, flags up only the latter.) If the outward-facing *toichos* falls, the internal structure of the tower can survive it; cf. Rihll, *Catapult* 51 (noting this as standard, in fact, in Ph.'s era but a change from earlier practice). See also Marsden, *Development* 130; Lawrence 383, citing tower L at Messene (his pl.31) as an instance.

For 'joists', *dokoi*, cf. A44.7–8 [*83.13–14*], A47.2 [*83.24*], B17.2–3 [*87.28–29*], C16 [*92.15–19*], and (on ships) C54.3–6 [*94.51–95.3*], and see generally Maier 2.90 with n.113.

A41.3–4 [*83.1–2*] **μένωσιν αἱ ὀροφαί** ('the roofs would remain'). For the roofs of towers cf. IG ii^2 463/Maier no.11 (see under A14 **κατάστεγα**) lines 50 ([Ἐὰ]ν δ[ὲ] τ[ι]νος [π]ύργου ἡ ὀροφὴ δεηθ|[ῆι) and 89 (τὴ]ν ὀροφ[ὴν τ]ῶν πύργων καὶ τῆς παρό[δου). The noun will be used again by Ph. in reference to the ceilings of granaries (B17.2 [*87.28*], B29.2 [*88.17*]) and the roofs of enemy stoas (C10.6 [*91.38*], C13.5 [*91.47*]) and the city's houses (C20.3 [*92.31*]).

A42.1 [*83.3*] **Ποιητέον δὲ καὶ πυλίδας παρ᾽ αὐτούς** ('Also to be made are posterns beside them'). The manuscripts have θυρίδας, windows (on which see already A20 under **θυρίδας**). Diels-Schramm 28 emend to <παρα>θυρίδας, a very rare compound noun epigraphically attested in third-century Delos (IG xi.2 163 A4), and Garlan 296 accepts this, yet oddly their translations in both cases do not reflect the emendation: 'Pforten', 'posternes'. For it is indeed the case, surely, that posterns are what Ph. is talking about here. The expansion ὥστε μήτε ψιλὰ τοὺς ἐκπορευομένους φαίνειν μήτε ὑπὸ τῶν λιθοβόλων αὐτὰς ἐκκόπτεσθαι essentially repeats aspects of A33–35 [*82.14–27*]. I have therefore, like Lawrence 80–81, adopted Rochas d'Aiglun's emendation of θυρίδας to πυλίδας. (Graux 134 achieves the same end with θυρίδας … <πυλίδας> παρ᾽ αὐτούς.)

A42.2 [*83.4*] **ὥστε μήτε ψιλὰ τοὺς ἐκπορευομένους φαίνειν** ('so that those going out on sorties do not expose their unprotected parts'). See under the preceding lemma.

On sorties see A9 under **ἵνα μή**. For ψιλά in this sense see again at A52.2 [*83.39*] and A52.4–5 [*83.41–42*].

A43.1–2 [*83.6–7*] **Τὴν δὲ ἄλλην οἰκοδομίαν ἀκολούθως τοῖς πρότερον δεδηλωμένοις κατασκευαστέον** ('The rest of the building is to be prepared in conformity with the previous instructions'). An unhelpful end to the section on the wall-trace in semicircles. If Ph. himself had been more explicit than this, either on what was encompassed by τὴν ἄλλην οἰκοδομίαν or on which particular 'previous

instructions' he meant, or both, epitomization has debased such detail into a statement of the blandest generality.

A44 [83.7–14]: the serrated wall-trace

A44.1–2 [*83.7–8*] **Ταύτῃ δὲ <ἡ> πριονωτὴ παραπλήσιος οὖσα τυγχάνει** ('Similar to this is the serrated (system)'). The text here is Graux's, printed by both Diels-Schramm 28 and Garlan 296; Schoene retained the transmitted Αὕτη δὲ πριονωτῇ.

This adjective πριονωτή, saw-like or serrated, might look self-explanatory in the broadest of terms, but it has not generated expert agreement as to exactly what it means in the architectural and archaeological terms being used by Ph. here:

(i) Rochas d'Aiglun (n.68) and Graux (135) share, in brief, an interpretation which focuses on the pentagonal towers mentioned later in the chapter: see the lemma below. For them it is the protruding angles of these towers, rather than the actual trace of the curtains themselves, which results in an appearance 'en forme de scie'.

(ii) Diels-Schramm 28 translate πριονωτή as *gezahnte*, glossing that in turn with 'zickzack- oder sägeformig'; and they cite as an illustrative instance the south-east wall at Priene. (Their fig 10 = T. Wiegand and H. Schrader, *Priene* (Berlin 1904) table VI. See also Winter, *Fortifications* 102 fig.76; Lawrence 352 fig.81.)

(iii) Winter, *Fortifications* 117–119 has a discursive treatment of the topic, which starts from a rejection of Diels-Schramm – despite translating πριονωτή, likewise, as 'zigzag' – and argues that this is in effect an angular variant of the semicircular trace. Instances are claimed along the South Wadi at Dura-Europos and the western front of the South Fortress at Gortys, Arkadia.

(iv) Garlan 245–246 does not cite Winter's analysis but essentially agrees with it. Theoretically, in his view, the term πριονωτή ought to imply a regular zig-zag made up of isosceles triangles, but given Ph.'s opinion about its especial suitability for terrain which is *skolios* (see A84.3–5 [*86.5–7*] and the Comm. there) it must in practice have deviated from such a geometrical ideal. The instances Garlan cites are, again, Dura-Europos (247 fig.16), together with the west-front wall at Ephesos (cf. Adam, *L'architecture* 230 fig.132), the south-east one at Miletos (246 fig.15) and that sector of Syracuse's wall north of the Epipolai Gate (187 fig.3).

(v) Lawrence 80 asserts that '[t]he noted resemblance [of the πριονωτή model] to the system 'with semicircles', and suitability to comparable terrain, imply the existence of vaguely comparable re-entrants. The difference seems to be that the curtains in some depressions are more thoroughly held against slipping by divisions into an echelon series of straight pieces of wall connected by jogs (shorter pieces approximately at right angles), some of which bear towers'. A later discussion expands on this as follows (Lawrence 349, here abridged and with my emphasis): '[t]he wall on each side of the re-entrant would be held firm, despite a steep gradient, owing to division into a number of small salients like the teeth of a saw; their straight outward faces, placed aslant, would be joined by shorter straight returns – jogs in archaeological parlance. Since all jogs must face downhill, in order to fit the contraction of the re-entrant in that direction, they could not be commanded from higher ground at the mouth […] *No example of this system is preserved;* though a series of jogs remains at various sites, it nowhere forms a re-entrant'.

(vi) McNicoll *Fortifications* 13 (following Diels-Schramm, according to Milner's note there) classifies Ph.'s πριονωτή system as an indented trace *en crémaillère* – the term (deriving from nineteenth-century French scholars such as Rochas d'Aiglun) defined in his Glossary as 'jogs or systems of jogs retreating in one direction only, so allowing for enfilade of curtains from one side'. McNicoll comments: 'Philon recommends the use of the indented trace with pentagonal towers. If we accept that the half-round tower serves a similar function […] the land wall at Iasus is a fine illustration of this combination'. (For this wall see Lawrence 184–187, with a plan of part of it at 184 fig.33.) However, confusion arises when McNicoll's later Glossary entry on 'saw-tooth trace' defines it as 'Philon's term for a system of angular salients *à tenailles* allowing for enfilade of curtains from two directions'. (Note also '*tenaille*: re-entrant, pincer-shaped walls, or (in series) 'saw-tooth trace''.) As Milner does not explain or eliminate this contradiction, McNicoll's views on the topic are ambiguous on that key point.

While the disparity in these assessments is all too glaring, they do appear to fall into two overall groups: nos. i (probably), iii and iv, which envisage the zigs and the zags, so to speak, as equivalent, even symmetrical; nos. ii, v and (apparently) vi, which visualize straight lengths of curtain with short jogs. Ph.'s vocabulary itself could settle the matter only if he had been thinking of one kind of saw-blade in particular, and we could be sure what it looked like. If wall-traces such as the ones at Iasos and Priene could properly be described as πριονωτή, the kind of saw invoked by that image would have to be one designed to cut only on the pull stroke, with (comparatively) long lengths of blade between the teeth. Nevertheless, Ph.'s reiterated link between the πριονωτή system and the one ἐκ τῶν ἡμικυκλίων συνισταμένη does seem to support the Winter/Garlan line of interpretation (and thus a system *à tenailles* rather than *en crémaillère*) – and doubly so if the rival one is equated with what is described in A55–58 [*83.47–84.5*], q.v. below.

See further under the other lemmata for this chapter

A44.2–3 [*83.8–9*] **ἣν Πολύειδόν φασιν εὑρεῖν τὸν μηχανοποιόν** ('which they say Polyidus the engineer invented'). Polyidus was a Thessalian, who seems to have been chief *mêchanopoios* to the kings of Macedon between, perhaps, 340 and 335: see E.W. Marsden, 'Macedonian military machinery and its designers under Philip and Alexander', *Ancient Macedonia II: papers read at the second international symposium held in Thessalonike, 19–24 August 1973* (Institute for Balkan Studies Thessaloniki 1977) 211–223, at 218–220; Garlan 208 and index s.v.; and other bibliography cited in Whitehead and Blyth, *Athenaeus* 84. The designation μηχανοποιός occurs again, generically, in B49.5 [*89.50*] and D12.5 [*97.38*]; and see Garlan 207 with n.6.

Translating εὑρεῖν here as 'invented' does seem unavoidable, even though its implications in English are perhaps more radical than Ph. intended. Note Garlan 227 on this verb as used by Athenaeus Mechanicus, Vitruvius (*invenire*, as equivalent), and others: 'dans un sens voisin de 'fabriquer, réaliser''. In any event, despite the textual obscurity as to where (and by extension when) Polyidus put his "inven-

tion" into effect – see under the next lemma – his name at least is a certainty here, and that fact is probably enough to warrant Garlan's supposition (245–246) that Philip II's reign saw the first formulations of schematic wall-trace systems. See also Lawrence 349: 'the Greeks habitually attributed innovations to individuals, who in some cases had merely used them to notoriously good effect, but this particular one is at least likely to have been developed in Polyeidus' generation, that being the earliest in which catapults became really powerful'.

A44.3–4 [*83.9–10*] **ἐν τῇ με<ταθέσει κα>τά τινας τῶν ἐπικαίρων τόπων** ('in the <change made at> certain advantageous sites'). Thévenot and other early editors speculated that the transmitted με here might be the beginning of the toponym Me<tapontum …>. According to Lawrence 473 the early-sixth-century wall there was 'improved later [with] alternation of immensely long straight sectors and concave re-entrants' (an aerial photograph in *New Scientist* 20 (1966) pl.2 is cited); IACP 280 refers to a 'C4-C3 strengthening with use of ashlar and reused blocks from older buildings, and a systematisation of drainage canals and city gates' at Metapontum; but none of this seems to make a good fit with Ph.'s context here, even if one could countenance the idea of Polyidus working as far west as Lucania.

Developing an original suggestion of Buecheler's, another topographical supplement was devised for this passage by Diels-Schramm 28 and accepted, albeit very reluctantly, by Garlan (246 n.1, 358 n.44*c*): ἐν τῇ Με<γαλοπόλεως περιτειχίσει· μάλιστα δὲ αὐτῇ χρῆσθαι δεῖ κα>τά. Caution is preferable, however, to textual supplementation which stretches so speculatively the establishable data about Polyidus (see preceding lemma); so already Whitehead and Blyth, *Athenaeus* 84 n.13, and again briefly D. Whitehead, 'Alexander the Great and the *mechanici*', in P. Wheatley and E. Baynham (ed.), *East and West in the World Empire of Alexander: essays in honour of Brian Bosworth* (Oxford 2015) 75–91, at 79 with n.20. Megalopolis does not take Polyidus as improbably far west as Metapontum but does place him, in an otherwise undocumented way, in the southern Peloponnnese in c.370 (on the date see T.H. Nielsen in IACP 520–521), when the c.9 km. city wall of mudbrick on a stone socle was built (IACP 522); and again, crucially, nothing in the rather poorly preserved remains there makes a good match with Polyidus and his serrated wall-trace (cf. Winter, *Fortifications* 118, with 58 fig.46).

There is in fact no compelling reason to think that a toponym featured in this lacuna at all. My alternative suggestion, which I have ventured to print here, starts from Schoene's conservative text, ἐν τῇ με<… κα>τά τινας, but accepts the μετα reported in all three manuscripts. This could be the beginning of a feminine noun with the same general sense: *metabasis*, *metabolê*, *metallagê* (for which cf. C35.1–2 [*93.36–37*], of a password), *metathesis*.

A44.4–6 [*83.10–12*] **παρ' οἷς καὶ πύργους οἰκοδομεῖν πενταγώνους κατὰ τὰ διαλείμματα τῶν μεταπυργίων** ('where also pentagonal towers should be built in accordance with the interstices of the curtains'). On the text of παρ' οἷς καὶ πύργους see A48 under **πύργοι**.

As Garlan 358 n.44*d* comments, the phrase 'in accordance with the interstices of the curtains', an oddly vague one, presumably means 'aux extremités des sail-

lants externes'. The noun διάλειμμα is more commonly found in philosophical, medical and musical writings (see LSJ s.v.) but a military usage can be paralleled in (e.g.) Plb. 1.66.3, Plut. *Aem.Paull.* 20.8 and Arr. *Anab.* 5.23.2.

For pentagonal towers see already A3–4 [*79.11–19*], and again (under the "double" wall-trace system) at A48 [*83.25–27*]; 'presumably composed of a beak and a rectangle' (Lawrence 80). Ph. gives no explanation for his – or Polyidus's – stipulation of this shape, instead completing the sentence (ἀφ' ὧν κτλ) with a clumsily-phrased cross-reference back to A41 [*82.50–83.3*].

A45–54 [83.15–47]: the 'double' wall-trace

A45.1–2 [*83.15–16*] **Παρὰ δὲ ταύτην ἄλλην τινὲς τειχοποιίαν δοκιμάζουσιν** ('Besides this, some approve another fortification-system'). On δοκιμάζειν see B50 under **Δεδοκιμάσθω**. The verb aside, Ph.'s phraseology here catches the attention. Is he distancing himself from the advocates of what A45–54 [*83.15–47*] will now describe? In any event they are quite unidentifiable; cf. e.g. *Bel.* 52.47 (Συνίστανται δέ τινες καὶ ἄλλως).

Even more than with the 'serrated' trace (A44 [*83.7–14*]), scholars have struggled to understand, and convey, a cogent version of Ph.'s 'double'-trace system of curtains presented in A45–54. Diels-Schramm give no discussion; instead, as 30 fig.12, they offer a set of five drawings which depict this system as they envisage it. Winter, *Fortifications* 120–121 does discuss the issue, and his 120 fig.94 could be described as a simplified version of the Diels-Schramm one which shows the curtains viewed in cross-section. However, Garlan 359 n.46*a* protests that Diels-Schramm (his 358 fig.54) and Winter (his 359 fig.55) go, alike, speculatively far beyond what Ph. says. Garlan's own suggestion, proffered with extreme caution (and not illustrated), is a wall in the form of a cut-down pyramid, crowned with a parapet of double thickness. Lawrence 82 is less than pellucid (even when read alongside the summary of Milner in McNicoll, *Fortifications* 12 n.83), though his later, discursive expansion (370–375) speaks of 'galleried curtains, in which an additional level for defence is interposed below the walk'; Pamphylian Perge and Side are adduced for comparison. However, McNicoll, *Fortifications* 12 acknowledges no extant examples in his zone of study.

This is, without doubt, the most obscure and elusive of Ph.'s six trace-types.

A45.2–4 [*83.16–18*] **ἐν ᾗ μικρὸν ἐκκλίνοντα τὰ μεταπύργια ᾠκοδόμηται ἑκατὸν πηχῶν τὸ μῆκος, τὸ δὲ πάχος ιβ΄, τὸ δὲ ὕψος ἓξ ὀργυιῶν** ('in which the curtains are built – bending slightly outwards – a hundred cubits (46.2 m.) in length, 12 (5.544 m.) in thickness, 6 fathoms (11.1 m.) in height'). Diels-Schramm 29 render μικρὸν ἐκκλίνοντα as 'etwas abweichend', which as Garlan 358 n.45*a* comments does not really convey a substantive sense. He himself implicitly follows Rochas d'Aiglun and Graux 135 with 'légèrement cintrées', and I have borrowed the equivalent 'bending slightly outwards' from Lawrence 83. Whatever μικρόν might turn out to be in practice, it does seem certain that this system stands in contrast with the one comprising semicircles, which present their concavities to the enemy (A39–43, at 39 [*82.43–45*]).

This is the only one of Ph.'s wall-traces for which he gives a (presumably ideal) length for each curtain. Milner in McNicoll, *Fortifications* 215–216 notes that a reasonable match for this is provided by the southern cross-wall at Miletos.

A thickness of twelve cubits exceeds the minimum of ten stipulated in A11.1–3 [*80.19–21*] (and cf. A17–19 [*80.45–81.5*], A20.3–4 [*81.8–9*]), and a height of six *orguiai* that of the twenty cubits (9.24 m.) of A12 [*80.25–27*]. (Dimensions in *orguiai* begin with single ones in Homer. For quantified multiples cf. e.g.: Hdt. 2.149.1–3, 4.41, 4.86.1–3; Xen. *Anab.* 6.4.3; Plb. 1.22.4–6; Diod.Sic. 2.8.5–6, 17.93.1; Plut. *Sol.* 23.6, *Artax.* 7.2; Arr. *Anab.* 2.18.3.)

A46.1–3 [*83.18–20*] **τὸ δὲ πρὸς τοὺς πολεμίους καθῆκον τοιχόκρανον δεῖ μείουρον διπλοῦν κατασκευάζειν** ('it is necessary to prepare the coping which faces the enemy tapering (and) doubled'). Graux 134 proposed to delete the words πρὸς τοὺς πολεμίους καθῆκον as an intrusive gloss (generated by ὁ πρὸς τοὺς πολεμίους καθήκων τοῖχος in A41.2–3 [*82.51–83.1*]), and a bad one as such; but only Lawrence 82 has actually done so. (For καθήκων in this sense cf. – besides A41 – C23.2 [*92.41*] and D57.2 [*100.48*].)

Beyond that, the vocabulary here is challenging. The neuter noun τοιχόκρανον, literally wall-helmet, is otherwise unattested. In the very broadest of terms it has to mean the top of the wall, a coping, but that falls short of explaining – as does Ph.'s aim, yet again, of minimizing damage from stone-projectors – what exactly is 'tapering' (μείουρον, literally mouse-tailed; Marsden, *Development* 124 n.4 has 'slanting') and what is double(d) that would, or might, otherwise be single. (A49.1–2 [*83.27–28*] will apparently answer the second of these questions by referring to the whole wall as διπλοῦν, but a sub-component of it seems to be at issue here, first.) In Diels-Schramm 29 μείουρον is ignored. Lawrence's translation (83) of μείουρον διπλοῦν as 'with two reductions (in thickness)' seems to confuse μείουρον with μεῖον, and in any case does not self-evidently contribute to a design feature likely to be efficacious against lithoboloi. In my opinion, therefore, it is safe to ignore Lawrence's translation of the ensuing ἀπέχον θάτερον θατέρου πήχεις ὄκτω – see the next lemma – as 'each (reduction) being 8 cubits apart (vertically) from the other'. That said, however, I sympathize with Garlan's evasiveness on the point of what component ἀπέχον θάτερον θατέρου is referring to.

A46.4–**47**.2 [*83.21–24*] **ἀπέχον θάτερον θατέρου πήχεις ὀκτώ· ἐπ᾽ ἔλαττον δὲ δώδεκα (47) ἄνωθεν εἰς ψαλίδας συγκλεισθέντων κτλ** ('the interval between the one and the other being eight cubits (3.696 m.); at least twelve (cubits) (5.544 m.) (**47**) upwards closed-together into vaults etc.'). The traditional approach to this opaque passage, exemplified by Schoene and Diels-Schramm 29, punctuates it after δώδεκα, i.e. leaving ch.47's ἄνωθεν κτλ to begin a new clause. (Before ἄνωθεν Schoene printed Egger's lacuna, Diels-Schramm Buecheler's supplement <τῶν δ'>.) But what could be the sense of 'eight cubits, at least twelve'? (Nobody seems to have suggested reversing the two numerals, to produce 'twelve cubits, at least eight'.) Garlan 296 – following A.J.A. Vincent, on whom see generally Garlan 287 – divides the material after ὀκτώ; and although this does not bring complete clarity I agree with Lawrence 82 that it is an improvement.

Assuming this to be correct, the material which begins with ἐπ᾽ ἔλαττον δὲ δώδεκα at A46.5–6 [*83.22–23*] and goes on to fill the short A47 [*83.23–25*] begs obvious comparison with that of A17–18 [*80.45–51*] on Rhodes. Marsden, *Development* 124: 'guard-rooms are again mentioned as being incorporated in the wall at ground level. They are to be covered over either by means of arches or with beams and boards, so that there will have been further casemates up above for artillery and, higher still, an upper rampart to accommodate yet more catapults'. However, I have already (under A17 **εἰς ψαλίδας**) endorsed Garlan's concern that the Schramm-Marsden model of what A17–18 describes is too elaborate, and as regards the present passage Marsden himself, while evidently accepting the main thrust of Schramm, 'Poliorketik' Tafel 27, Abbild 84, goes on to express some misgivings: 'Schramm's reconstruction, based on Philon's difficult account, which is not over-generous with its information, is not altogether convincing. [A footnote expands, with objections on three separate counts.] We suspect [...] that the whole system was a theoretical one, perhaps Philon's own proposal for a modified version of the Rhodian defensive arrangement'.

A47.3 [*83.25*] **ἐπὶ δὲ τῶν διεξόδων πυλίδες ἐπιτίθενται** ('and posterns are positioned at the exits'). 'Exits' (*diexodoi*) – literally, through-ways-out – is a term used by Ph. only here. He presumably wants a postern (on which see at A9 **τὰς πυλίδας**) at each one, but gives no hint about how frequently the *diexodoi* would occur; surely not at every guardroom.

A48.1–2 [*83.25–26*] **Κατὰ δὲ τὸ μέσον αὐτῶν** ('In the midst of these (curtains)'). The phrase cannot mean geometrically in the middle, given the ensuing qualifier: οἰκοδομοῦνται κατὰ τοὺς ἐπικαίρους τόπους.

A48.2 [*83.26*] **πύργοι <ἢ> βάρεις** ('towers <or> bastions'). The manuscripts have πύργοι βαρεῖς (not, *pace* Lawrence 82, 'the compound πυργοβάρεις' – on which see nevertheless below), rendered by Graux 137 with an equivalent noun-plus-adjective phrase: *tours pleines*, heavy towers. Graux's note, however, cites parallel passages, in Ph. and elsewhere, for both *baris* and *purgobaris* as nouns, and indeed they are well enough attested as such: *baris* (LSJ s.v. 2) copiously in the Septuagint (e.g. *Psalms* 44.9, 47.14, *Daniel* 8.2, 2 *Chron.* 36.19), and Josephus (e.g. *AJ* 10.265, 11.99, 13.307, 20.85, *BJ* 1.75; *purgobaris* in Septuagint *Psalms* 121.7 and *Psalms of Solomon* 8.19. See generally Garlan 359–360 n.48*a*; A. Avram and G. Vlad Nistor, *Studii şi Cercetari di Istorie Veche* 33 (1982) 365–376 (reported in SEG 32.722); E. Will, 'Qu'est-ce qu'une *baris*?', *Syria* 64 (1987) 253–259.

If the present passage juxtaposes two nouns, *purgos* and *baris*, Buecheler's supplement <ἢ> is needed to divide them, as in Schoene (and Garlan 297). Diels-Schramm 29 spurn this supplement because they expel [βάρεις] from the text as 'byzantisches', a *Fremdwort* intruding from the Septuagint. No such expedient needs to be adopted in one earlier passage, A44.4–5 [*83.10–11*], where Schoene's conjecture βάρεις καὶ πύργους οἰκοδομεῖν has not displaced the transmitted παρ᾽ οἷς, but there are three later ones which seem to confirm that the word does belong in Ph.: A62.2 [*84.19*], on which see the Comm. thereto; A63.3–4 [*84.23–24*], τοὺς

τοίχους τῶν βαρῶν (Diels-Schramm 33 print Egger's πύργων); and A67.1 [*84.36*], Τῶν δὲ βαρῶν καὶ τῶν πύργων (Diels-Schramm 34 delete [βαρῶν καὶ τῶν]).

With the place of *baris* secure in Ph.'s vocabulary, one would wish to know the essential difference, as he saw it, between a *baris* and a *purgos*; or in other words, why both terms were needed. On this see under A62 **ἀνίσων**.

A49.1–3 [*83.27–29*] **Συμβαίνει οὖν τῇ μὲν γίνεσθαι διπλοῦν <τὸ> τεῖχος, τῇ δὲ πύργοις πεφυλαγμένον** ('The outcome therefore is that the wall is on the one hand doubled, on the other protected by towers'). This is the orthodox understanding of τῇ μέν … τῇ δέ … here (whatever is held to be the implicit feminine noun), i.e. two points made about the whole wall. Only Lawrence 83 sees things differently: 'the Wall is double in one (portion) while in another it is guarded by towers'.

The long succession of infinitives which now follows, lasting until A52.5 [*83.42*], all depend on either this Συμβαίνει (so Vahlen ap. Schoene) or else the ὥστε later in A49.3 [*83.29*] (so Buecheler ap. Schoene).

A50.1 [*83.30*] **τὰς … προστιθεμένας δοκίδας** ('the (enemy) screens being put forward'). See above, under A22 **καταγνύωσι**.

A50.2–3 [*83.31–32*] **τὰς προσῳκοδομημένας στοάς** ('the stoas (already) built in advanced positions'). Ph. will mention 'stoas' again at A73.5–6 [*85.10–11*], A82 [*85.46–49*], C8 [*91.25–28*], C9.3–4 [*91.30–31*], C68.5–7 [*96.6–8*], D10.7–8 [*97.25–26*] and (with most detail on character and construction) D51 [*100.25–32*], but he does not always mean the same thing by the term.

Certainly at issue in all these passages is a στοά in sense III (I and II are architectural stoas, i.e. actual buildings) recognized by LSJ s.v.: '*long roof* or *shed* used in sieges, *SIG* 569.36 (Halasarna, iii B.C.), Plb. 1.48.2: – *gallery, communication trench*, whether above ground or excavated, Ph. *Bel.* 83.32 [= A50], 85.10 [= A73], 91.31 [= C9]'. Furthermore, the (single) stoa mentioned in line 36 of the late-third century Coan honorific decree from Halasarna (Syll.[3] 569; Maier no.46), is an irrelevance; Dittenberger there correctly adduced Aen.Tact. 11.3, an architectural stoa involved in an anecdote about Chios.

That seems to leave either two or three authentically military applications of the term. One is the "Polybian" (as in 1.48.2) stoa, so to speak: a light, portable construction carried forwards by troops or others for their own protection; Walbank in HCP 1.111 on that passage equates it with the Roman *vinea* or *porticus* attested from Julius Caesar onwards (see generally O. Lendle, *Texte und Untersuchungen zum technischen Bereich der antiken Poliorketik* (*Palingenesia* 18: Wiesbaden 1983) 136–141), and notes that in a later passage (21.28.4) Polybius's phrase προεβάλοντο στοάν turns into a mention of *vineae* in Liv. 38.7.6–7. These are what in C12.1–2 [*91.40–41*] Ph. calls stoas 'made out of wicker' (ἐκ γέρρων πεποιημέναι); and what he later calls wicker-tortoises (γερροχελώναι: D19 [*98.17–20*], D36 [*99.29–32*], D43.2–3 [*100.3–4*]) sound like *vineae* in all but name. From these, in C13.1 [*91.43*], he distinguishes 'built-in' (ὀρυκταί) stoas. But further differentiation within this second category seems needed. In Plb. 21.28.4 (preserved in the *de obsidione toleranda*), for instance, the 'stoa' used in the Roman siege of Ambrakia in

189, and parallel to its wall, is not only singular but said to be 200 feet long, a feature which if true obviously disqualifies it from being portable; and note the similarly parallel 'stoa' in Plb. 9.41.1–7 (on Philip V's siege of Echinos). As to Ph. himself, some of his eight mentions of a poliorcetic stoa might imply portability (so A73.5–6 [*85.10–11*], C68.5–7 [*96.6–8*]), whereas others appear to concern a stationary structure (so the present passage itself, and D51 [*100.25–32*]). For this latter cf. also – albeit behind the front line – Diod.Sic. 20.91.8 (Demetrius Poliorcetes at Rhodes 'prepared stoas through which those who were going to their labours might proceed and return safely') and in other terms Plb. 9.41.9 on Ambrakia (creation of 'roofed pipes', *syringes katastegoi*, 'so that neither those going out from the camp nor those returning from their labours would be harmed by the projectiles fired out of the city'). The evidence as a whole, therefore, supports Graux's distinction, within non-portable stoas, between 'les unes parallèles au front attaqué et reliant entre eux les divers engins de l'assiégeant, les autres transversales et assurant les communications des parallèles entre elles et avec le camp' (Graux 145).

See further in the Comm. to the other instances.

A50.3–5 [*83.32–34*] **ἐκ τοῦ πλαγίου τυπτομένας τοῖς λιθοβόλοις [καὶ κριοῖς] τὰς μὲν συντρίβειν, τὰς δὲ ῥᾳδίως καταβάλλειν** ('are struck from the side by stone-projectors [and rams], some being crushed, others easily overthrown'). Expanded in C8–17 [*91.25–92.22*].

It was Graux (136) who deleted the words καὶ κριοῖς, as being a faulty displacement of a phrase that properly belongs in the previous line: τὰς προσῳκοδομημένας στοὰς [see preceding lemma] καὶ κριούς. Buecheler's suggested emendation (ap. Schoene) of καὶ κριοῖς to the adverb καίριως, 'in a timely way', employs different means to the same end: removing from this passage a mention of defenders' rams (as opposed to those of the attackers: A51.3–5 [*83.36–38*]). Orthodoxy holds that the passage can stand as transmitted, and the justification for this is implicitly – the matter is never discussed – because in other passages, too, Ph. appears to assume that the defenders do have rams at their disposal: see esp. C14–17 [*91.47–92.22*] and the brief mention at D48 [*100.17–20*]. It is true that at C15–17 [*92.8–22*] Ph. will recommend a defensive *antikrios* – a distant descendant of the one in Aen.Tact. 32.7 – for use in very specific circumstances (see the Comm. thereto), but otherwise the idea that rams either did or indeed could play a part in defending walled cities derives no support from the historical record, besides being counter-intuitive *per se*. I have therefore taken the view that their appearance in that role in the present passage, and also in C14.11 [*92.6*], is textually unsound and needs to be emended, whether by deletion or other means. (In the present instance I adopt Graux's simple deletion, as indicated above, though Buecheler's καίριως has attractive parallels in Polybius and elsewhere with verbs of striking.) As regards D48.1 [*100.17*], a deletion could be advocated there also, though in preference to that I argue for understanding D48 [*100.17–20*] as written from the defenders' perspective (so that the rams being countered are those of the attackers) : see the Comm. there.

A51.2 [*83.35*] **τοὺς ὑπορύττοντας καὶ τοὺς ὑπ᾽ αὐτοῖς ὄντας** ('the tunnellers and those under them'). Graux 136 considered these two phrases tautologous and

wished to eliminate the first of them. Though his objection (and response to it) has not been taken up, the orthodox view nonetheless is that what the second group are 'under' is the screens mentioned in A50.1 [*83.30*], τὰς … προστιθεμένας δοκίδας. Strict grammatical accuracy (which, admittedly, Ph. does not always display) would however require the whole phrase to be τοὺς ὑπ' αὐταῖς ὄντας. Recognizing the problem, Graux suggested making precisely such an emendation. Simpler, in my view, is to retain the paradosis and, with it, a second group of men who are working 'under' (i.e. in support of) the tunnellers.

A51.3–5 [*83.36–38*] **βρόχους περιβάλλοντας περὶ τοὺς κριοὺς ῥᾳδίως καθέξειν ἢ κυριεύσειν αὐτῶν** ('by throwing nooses round the rams one can easily hold them back or gain control of them'). For such nooses cf. C14.11–13 [*92.6–8*] (and D48 [*100.17–20*]). What Ph. envisages here had already been recommended by Aen. Tact. 32.4 (Καὶ ὅταν ἢ πύλην ἢ ἄλλο τι τοῦ τείχους διακόπτῃ, χρὴ βρόχῳ τὸ προΐσχον ἀναλαμβάνεσθαι, ἵνα μὴ δύνηται προσπίπτειν τὸ μηχάνημα), and is subsequently characterized by Livy (36.23.2) as the normal way of dealing with rams: *non laqueis, ut solet, exceptos declinabant ictus*. (Instead these defenders of Herakleia-by-Oita in 191 made sorties and burned them.) See also Veget. 4.23, probably deriving from Aeneas. Occasions when nooses did fill this role include Plataiai against the Peloponnesians in 429 (Thuc. 2.76.4), Kyzikos against Mithradates VI in 73 (App. *Mith.* 320) and Jerusalem against Titus in 70 CE (D.C. 66.4.4); and see generally Garlan 137 n.7.

A52.1–2 [*83.38–39*] **τούς τε προσερχομένους εἰς τὸ τεῖχος εἰς τὰ ψιλὰ τυπτήσειν κτλ.** ('and the men advancing on the wall you will strike on their unprotected parts etc.'). Here for the third time – cf. already A33 [*82.14–21*] and A42 [*83.3–5*] – Ph. is alert to the vulnerability of the infantryman's unshielded right side. For τὰ ψιλά in this sense (overlooked in LSJ s.v. ψιλός, III), already at A42 and (again later in the present chapter: μὴ διδόντας τὰ ψιλὰ τοῖς πολεμίοις), cf. Arr. *Anab.* 1.2.4 (which is in fact the only precise parallel for Ph.'s εἰς τὰ ψιλά: facing the Triballians in 335, Alexander sends archers and slingers ahead, εἴ πως προκαλέσαιτο αὐτοὺς ἐς τὰ ψιλὰ ἐκ τοῦ νάπους). The difference, though, between the present context and the earlier two is that here the *enemy*'s vulnerability – something to be exploited rather than avoided – is being envisaged. Vitruv. 1.5.2 has what seems to be an echo: *excogitandum uti portarum itinera non sint directa sed scaeva. Namque cum ita factum fuerit, tum dextrum latus accedentibus, quo scuto non erit tectum, proximum erit muro.*

A53.1–2 [*83.42–43*] **Ταῦτα δὲ πάντα συμβήσεται καὶ ἐν ταῖς ἄλλαις τειχοποιίαις** ('All these things will obtain in the other fortification-systems too'). Another unfocused remark which can perhaps be attributed to the epitomization process (cf. under A43 **Τὴν δὲ ἄλλην**), but this time – whether or not that is so – more justifiable, if it really is the generalization that it purports to be. Garlan 360 gives a (relevant) cross-reference back to A33–35 [*82.14–27*], material presented within the context of just one of these other *teichopoiiai*; the 'old' one in his view, but more probably the 'meandering' one (see under A39 **Ετέρα**).

A54.1–2 [*83.44–45*] **Δεῖ <δὲ> τὰ προτειχίσματα αὐτῶν ὡς ἰσχυρότατα ποιεῖν τὸν αὐτὸν τρόπον τοῖς τείχεσιν οἰκοδομοῦντας** ('It is necessary to make their outworks as strong as possible by building them in the same way as the walls'). The section ends weakly, with more questions than answers: the distinction made (or implied) between 'the outworks' here and 'the other *oikodomiai* and the palisadings' in the second part of the sentence; and, even more mysterious, how any of these structures can be built 'in the same way as the walls'.

A54.4 [*83.47*] **οἵας πρότερον εἰρήκαμεν ποιητέον** ('are to be done in the ways we have previously stated'). In A37–38 [*82.32–42*], as far as the palisadings are concerned; more broadly see A35 [*82.22–27*].

A55–58 [83.47–84.5]: the wall-trace with slanting curtains

A55.1–3 [*83.47–49*] **Εὐχερεστάτη δέ ἐστι τειχοποιία καὶ ἀσφάλειαν ἱκανὴν ἔχουσα** ('There is a(nother) fortification-system very practicable and affording adequate security'). Diels-Schramm 31 understand Εὐχερεστάτη as '*Der* leichteste' and Lawrence 83 as '*the* handiest' (my emphasis), but without a definite article (cf. under A29 **διεστηκότες**) I do not agree that Ph. is saying most practicable of all; cf. Rochas d'Aiglun ('extrémement simple'), Graux 139 ('très facile à faire'), Garlan 297 ('très facile à réaliser').

This system, presented here in A55–58 [*83.47–84.5*] and summarily listed in A84.7–8 [*86.9–10*] as a trace-type suitable τοῖς περιφερέσι χωρίοις (see the Comm. there), is characterized as one in which the curtains are built λοξά ('slanting'), with their towers positioned – for best protection against 'machines' – so as to create one acute and one obtuse angle with the wall: τὴν μὲν ὀξεῖαν, τὴν δὲ ἀμβλεῖαν γωνίαν ποιοῦντες τὰς προσηκούσας πρὸς τὸ τεῖχος (A56.1–3 [*83.50–84.1*]). Thus the overall concept can hardly differ significantly from what is depicted in Diels-Schramm 31 fig.13, even if the tower-shape – on which Ph. is silent – is not necessarily the (offset) square one shown there. Garlan 249–250 (cf. 360) declares explicitly that Ph.'s slanted-curtain system is one which has its trace *en crémaillère* (cf. A44 under **Ταύτῃ**), and most other discussions imply that term without actually using it: see esp. Winter, *Fortification*s 121–122 (expanding 'Indented trace' 425–426), and Lawrence 349–355. (McNicoll, *Fortifications* 13 appears to differ; see Milner's n.89 there.)

As to archaeological remains, it is agreed that the southern cross-wall at Miletos furnishes a prime example (Winter, *Fortifications* 121 with fig.100; Garlan 360 n.56*a* with fig.56; Lawrence 350 with fig.79; Adam, *L'architecture* 49 n.53; McNicoll, *Fortifications* 13), but other sites mentioned in this context include: the NE corner of the Aspis at Argos (Winter, *Fortifications* 121 with fig.99; Garlan 357 fig.61); the Ptolemaic wall at Cyrenaic Apollonia (J.G. Pedley, 'Excavations at Apollonia, Cyrenaica', *AJA* 71 (1967) 141–147, at 147 pl.47 fig.1; Garlan 248–249 with fig.18, 360 n.56*a*; Lawrence 339, 355; Adam, *L'architecture* 49 n.53); the south-front akropolis wall at Samikon, Triphylia (H.L. Bisbee, 'Samikon', *Hesperia* 6 (1937) 525–538, with a mid-fifth-century date now regarded as at least a century

too early; Winter, *Fortifications* 236–238 with figs.246–247 and 250; Garlan 248 with fig.17; Lawrence 355 with pl.70); and Gortys (Winter, *Fortifications* 122 with 123 fig.102; Lawrence 353).

A58.1–3 [*84.3–5*] **Τὸν αὐτὸν δὲ τρόπον καὶ ἐν τοῖς στρατοπέδοις τειχοποιητέον ἐστίν, ἐὰν προσδέχηται πολιορκίαν τινά** ('In the same way there must be fortification in camps too, if a siege is expected'). At first sight this is an unexpected, and puzzling, addendum to A55–57 [*83.47–84.3*]. Apart from the generalized mention of a στρατόπεδον in B56.4 [*90.37*] on signalling, Ph.'s other mentions of 'camps' (*vel sim.*) all come in part D, where the stance of the attackers is being taken: see D6 [*96.42–49*], D10 [*97.19–30*], D87–88 [*103.16–25*] and D99 [*103.45–50*]. Does the present passage, likewise, temporarily adopt that perspective? Perhaps it does, and if so there is a parallel of sorts in D33 [*99.19–20*], where smoking opponents out of tunnels is described as an effective tactic for besieged and besiegers alike. Yet in the present instance the addition of 'if a siege is expected' does suggest the opposite: circumstances – however rare in practice – in which the defenders of a city needed or wanted to station troops in an external camp.

Ph. should have explained, in any event, why he thinks the slanted-curtain model is especially suitable for camps. (Lawrence 349 misrepresents what Ph. is saying when he comments that Ph. appears to regard this type of trace as 'inferior if used in a permanent enceinte, though a reliable makeshift for a camp'.)

A59–61 [84.5–18]: the 'old' wall-trace

A59.1–2 [*84.5–6*] **Ἐν δὲ ταῖς ἀρχαίαις τειχοποιίαις κτλ.** ('In the old fortification-systems etc.'). See already under A17 **Τινά** and A39 **Ἑτέρα**. If Garlan's opinion that such 'old' systems have been Ph.'s topic throughout A1–38 [*79.1–82.42*] is mistaken, as I contend, it is not one broached until now.

See further Winter, *Fortifications* 123–124.

A59.2–3 [*84.6–7*] **δεῖ τοὺς πύργους προεκτιθέναι κατὰ μίαν γωνίαν** ('it is necessary that the towers project at one corner'). Cf. A3 [*79.11–16*] and A7 [*79.26–80.5*], with Comm. thereto.

A59.3–4 [*84.7–8*] **τὰ δὲ μεσοπύργια οἰκοδομεῖν καθάπερ ἐν Ῥόδῳ κατεσκευάσται** ('and that the curtains are built just as has been provided for in Rhodes'). Cf. A17–19 [*80.45–81.5*], with Comm. thereto.

A60.1–3 [*84.8–10*] **Τῶν δὲ ἐπάλξεων τὰς μὲν ὑποστάσεις δεῖ ποιεῖν τριῶν πλινθίων** ('It is necessary to make the supports of the parapets (with a dimension) of three (?)small blocks'). A very problematic passage, whether or not it is textually sound as transmitted.

Graux 140 posited a lacuna after τριῶν, to allow for the phrase τριῶν <σπιθαμῶν τῷ ὕψει (or τῷ βάθει), τὸ δὲ πάχος τριῶν> πλινθίων, 'three <spans in height (or depth), and in thickness three> briquettes'. This supplement, Graux held, created a

link between the present passage and one in Syrianus Magister 12.18–19: Τὰς δὲ ἐπὶ τῶν τείχων ἐπάλξεις ἐγγωνίους γίνεσθαι, ὥστε ὑποβλέφαρα ἔχειν οὐκ ἔλαττον ἔχοντα τὸ βάθος σπιθαμῶν τριῶν. However, Garlan 361 objects that such covers (ὑποβλέφαρα: literally eyelids) are not to be equated with Ph.'s ὑποστάσεις, which are instead, he believes, columns or pillars reinforcing the parapet; see Garlan 199, with instances from Phyle in Attica (Winter, *Fortifications* 139) and Messene.

All other editors reject Graux's supplement without comment, but there is no consensus on what the paradosis signifies without it. The twin cruces are the substantive meaning, and consequent function, of these ὑποστάσεις and what is meant by describing them as τριῶν πλινθίων. Diels-Schramm 32 take it for granted that the dimension expressed as τριῶν πλινθίων is height ('3 Quadern hoch'), but Lawrence 85 opts for depth ('three bricks (thickness)'), and Garlan 361 n.60*a* contemplates *both* dimensions. Given this degree of uncertainty, and even with the help of the purposes Ph. has in mind (see the next two lemmata), I find it impossible to reach a clear view of these structures. 'Als ὑποστάσεις ἐπάλξεων bezeichnet [Ph.] das Unterteil der Brüstungsmauer' (Maier 2.83 n.66) adds little enlightenment; and while Garlan rejects Diels-Schramm's 32 fig.14 out of hand he does not venture one of his own.

A60.3–5 [*84.10–12*] **ἵνα ὑπὲρ αὐτῶν βάλλειν δύνωνται τοῖς προβόλοις οἱ φύλακες τοὺς πλησιάζοντας τῷ προτειχίσματι** ('in order that the guards can throw missiles over them at those coming close to the outwork'). Diels-Schramm 32 translates *proboloi* as 'Speere', and Lawrence 85 even more specifically as 'hunting-spears', a sense it certainly bears in Hdt. 7.76 (and cf. *probolia* in Xen. *Cyn.* 10.1). The orthodox view – registered in LSJ s.v. – gives it a more general meaning here.

A60.5 [*84.12*] **αἱ δ' ἐργωδῶς ἀποκόπτονται** ('and they are severed (only) with difficulty'). As transmitted, this must refer to the mysterious *hypostaseis* of A60.1 [*84.8*] (see Comm. above), and editors seem to have found this unproblematic. For a speculative alternative see Brinkmann ap. Schoene: οἱ δ<ὲ προμαχῶνες … τὸ πάχος ὄντες vel πεποιημένοι> ἐργωδῶς ἀποκόπτονται.

Ph.'s unusual adverb here will be used again at C22.5 [*92.40*] and C38.3 [*93.50*]; no other surviving author has as many instances. See also Thphr. *HP* 9.16.5 on the difficulty of finding an effective antidote to aconite poisoning, and especially medical writings *per se* (e.g. Hipp. *Aphorisms* 6.6: kidney and bladder problems ἐργωδῶς ὑγιάζεται in the elderly).

A61.1–3 [*84.13–15*] **Πρὸ δὲ τῶν τετραγώνων πύργων προοικοδομεῖν δεῖ τριγώνους ἄλλους συνεχεῖς καὶ στερεοὺς ἀπὸ ἰσοπλεύρου τριγώνου κτλ.** ('In front of the tetragonal towers it is necessary to build out other, triangular ones, continuous and solid in the shape of an equilateral triangle'). That A61 [*84.13–18*] does belong with A59–60 [*84.5–12*] is a point that Diels-Schramm 32 appear to call into question with their paragraphing; I follow Winter, *Fortifications* 123 (and, implicitly, Garlan 298).

Greek στερεός – twice in this sentence, which continues with the phrase τὴν ἐκκειμένην γωνίαν στερεὰν καὶ ἰσχυρὰν οὖσαν – is in itself just as ambiguous as

English 'solid', i.e. capable of meaning either (merely) strong or having no internal space. Most translators do not spell out which of these two senses they believe is intended here, but Lawrence 84 is surely right (in contrasting a 'solid triangle' with a 'hollow rectangle') to imply the latter.

Strictly speaking, 'continuous' might require the triangular beak to be in contact with (but structurally distinct from) the rectangle, but I agree with Lawrence that the term 'is compatible with leaving a gap between them, as would be preferable for technical reasons and was actually done by Byzantines nearly a thousand years later'. This last point refers to the fact that, although classical and Hellenistic architecture furnish no specimens of what Ph. describes here, some fortifications of the Byzantine era do. Amongst those noted by Garlan 361–362 n.61*a*, the one at Salona (present-day Solin, Croatia) is especially noteworthy: see E. Dyggve, *Recherches à Salone* I (Copenhagen 1928) 18–19 with pl.B. Lawrence 388 comments: 'Philo advocates protecting the fronts of quadrangular towers by buffers of solid masonry in the form of an equilateral triangle; no Greek example has been found, and the Byzantine adoption of the method at Salona in Dalmatia may have resulted, not from persistence through some eight centuries, but from reading Philo'.

A62–63 [84.18–24]: structural features of the 'double' system

A62.1–2 [*84.18–19*] **Τοῖς δὲ πύργοις τὰ μεταπύργια οὐ δεῖ συναγαγεῖν** ('One must not connect the curtains with the towers (in the 'doubled' system)'). Garlan 362 n.62*a* points out that this principle could be effected in two ways: 'soit en accolant les tours au parement externe du rempart, qui servait dans ce cas de mur de fond, soit en les concevant comme des ensembles autonomes, sur les flancs desquels venait buter l'extremité des courtines adjacentes'. Of the examples he gives, sites like Gortys and Pagasai/Demetrias illustrate both procedures (used, in the latter case at least, in different eras). Otherwise, for the first see e.g. Mantineia (cf. Garlan 192 fig.4). The second approach, the one that Ph. surely had in mind, is particularly clear at e.g. Miletos (360 fig.56) and Side (345 fig.45); and see also Konecny and Ruggendorfer, 'Alinda' 721 (citadel) and 730 (town circuit).

Lawrence 221 (here abridged) comments as follows on the general issue: '[a] tower in an enceinte might be either built as an independent structure or joined to an outward face of the curtains by bonding the stonework [… In the latter case] the tower and curtain supported one another. This advantage remained the generally paramount consideration after the development of siegecraft reached the stage at which a wall could easily be felled; for instance, the forty-eight towers still visible at Ephesus are all bonded, though built about 286, while a seemingly indiscriminate mingling of bonded and unbonded towers occurs in fortifications of even later times […] Bonding can never have been desirable in all circumstances. On ground where subsidence or slipping could be anticipated, and at any place notoriously subject to earthquakes, builders of whatever period might have seen cause to divide the wall into structurally independent units. In any event, the additional time and labour which bonding entailed must often have deterred builders who were in a hurry or

short of money'. See also McNicoll, *Fortifications* 11: 'Philon (A62–3) advises that towers and curtains should not be joined. In fact separation never became universal, though it is my impression that it is more widespread at the end of the Hellenistic period than at the beginning'. Be that as it may, where Ph. is concerned an important point that needs to be made is that he is not, it seems, generalizing about *all* towers and curtains (as apparently assumed by McNicoll, and also by e.g. Winter, *Fortifications* 167) but making a recommendation that applies *only to the 'doubled' wall-trace system* (A45–54 [*83.15–47*]); hence my parenthesis in the translation here, in which I follow Lawrence (84–85, 221). What shows this is the allusion to the bastions at the beginning of the explanatory clause: see the next lemma. Thus A62–63 [*84.18–23*] is material which elaborates A45–54. (For this and other reasons I am unconvinced by Fleury, *Vitruve* 143 that the present passage has anything to do with the phrase *dividendus est murus* in Vitruv. 1.5.4.)

A62.2 [*84.19*] **ἀνίσων γὰρ ὄντων τῶν βαρῶν** ('for with the bastions being unequal'). For 'bastions' see under A48 **πύργοι**. The preponderant view amongst scholars (Rochas d'Aiglun, Graux, Diels-Schramm, Garlan) understands βαρῶν here as weights or masses, but Arnim, *Index* 10 classifies the passage under *baris*, not *baros*, and I think rightly so. 'A grammatically feasible translation of ἀνίσων γὰρ ὄντων τῶν βαρῶν as 'because the weights are unequal' would make the sentence forbid the bonding of curtains to towers of whatever kind and adduce a reason of no practical validity for that extremely unlikely prohibition. In fact … [A63] almost proves that Philo is writing exclusively about [bastions]': Lawrence 84.

That said, the sense in which such bastions can be described as 'unequal' is not self-evident. Unequal *with each other* (i.e. of varying sizes)? Perhaps so, but another possibility is suggested by Lawrence 391–393, at 393: intrinsically unbalanced, by dint of being "open-gorge", i.e. without a back wall. He adduces instances of this at e.g. Krane/Kranioi, on the island of Kephallenia (cf. 181–182; Garlan 333), and at Side.

A63.1 [*84.21*] **Τούτων δὲ συμβαινόντων ῥήξεις ἐν τοῖς τείχεσιν ἔσονται** ('When these (connections) do occur, there will be rents in the walls'). The future indicative conveys here certainty on a point about bonding that, in truth, can only be hypothetical.

'Rents' (ῥήξεις) are more typically encountered in scientific and, above all, medical writers, but for the cognate verb ῥήγνυμι see under A1 **μὴ ἔνδον**.

A63.2–3 [*84.22–23*] **ἐὰν πέσῃ τι τῶν μεταπυργίων, ἐπισπάσεται τοὺς τοίχους τῶν βαρῶν** ('if any part of the curtains should fall, it will involve the sides of the bastions'). Garlan 362 cites – as had J. M. Cook in his review (*CR* 23 (1973) 294–5) of Winter, *Fortifications* – an instance of the opposite (Myndos, attacked by Alexander in 334: Arr. *Anab.* 1.20.5–7): a tower falls, after mining, but the wall stays up and keeps the attackers out. A collapse of three towers and their intervening curtains simultaneously occurred, according to Liv. 21.8.5, during Hannibal's siege of Saguntum in 219 (*tres deinceps turres quantumque inter eas muri erat cum fragore ingenti prociderunt*).

A64–66 [84.24–36]: structural features of 'semicylindrical' towers

A64.1–2 [*84.24–25*] **τοὺς λίθους τῶν ἡμικυλινδρικῶν πύργων** ('the stones of semicylindrical towers'). All the manuscripts give this adjective as ἡμικυλίνδρων; the standard emendation to ἡμικυλινδρικῶν (a *hapax legomenon*, if correct) is Schoene's. In either form, it inevitably recalls ἐκ τῶν ἡμικυκλίων in A39.2 [*82.44*], which will reappear in A84.3–4 [*86.5–6*], though that phrase applies to a wall-trace, not to individual towers. The present passage's 'semicylindrical' towers are what A2.3 [*79.9*] has called 'rounded on the outside etc.', ἔξωθεν περιφερεῖς κτλ.

On what follows here, A64–65 [*84.24–34*], note Milner in McNicoll, *Fortifications* 214 ('Architects were now applying the newly discovered techniques of voussoired arches and barrel-vaulting to the horizontal plane, in order to achieve greater resistance to rams and [*sc.* artillery] bombardments in accordance with Philon's theory') and – more circumspectly where Ph. is concerned – Rihll, *Catapult* 163 ('Another solution to the problem of bombardment was the semi-circular tower; Philon recognized that stones that were shaped like the voussoirs of an arch, here laid flat on the ground so that they were wider outside than inside, could not be pushed inward by stone-thrower impacts'). Garlan 363 n.65*a* (following Martin, 'Gortys' 123) cites the instance of Gortys, Arkadia.

A64.2–4 [*84.25–27*] **τὴν ἔξωθεν περιφέρειαν καταμετρήσαντα καὶ πρὸς αὐτὴν ἐμβολεῖς ξυλίνους κατασκευασάμενον** ('after measuring the outside curvature (required) and preparing, on the basis of it, wooden templates'). Such templates are mentioned in *Bel.* 70.9 & 13 (likewise for tracing curves), and cf. also Hero, *Bel.* 20.2–3. (The equivalent term in building inscriptions, as Garlan 362 n.64*a* observes, is παράδειγμα, in LSJ's sense I.a): see e. g. the 347/6 specifications of the Peiraieus (a. k. a. Philon's) Arsenal at Athens (IG ii^2 1668; Syll.^{3} 969) lines 86 (πρὸς τὸ παράδειγμα ποιήσας) and 95–96 (πρὸς τὸ παράδειγμα ὃ | ἂν φράζῃι ὁ ἀρχιτέκτων); and generally Martin, *Manuel* I 177–178.) For καταμετρεῖν in the context of transferring between actuality and a model – though in the opposite direction there – see *Bel.* 55.47.

Curved towers did, for obvious reasons, impose particular demands on the *lithourgoi* (for whom see under the next lemma). In lines 90–102 of the Athenian decree of 337/6 about repairs to the Long Walls and Peiraieus walls (IG ii^2 244/ii^3 429, Maier no.10: see under A31 **<...> καὶ λίθοι**) the contractors are required to observe exact specifications in that regard: οἱ μισ[θωσά]|μενοι ἀποδώσουσιν πεποιημ[ένα ἃ]|παντα ὀρθὰ καὶ ἁρμόττοντα πα[ντα]|χῆι καὶ πρὸς τὴν ἔντορνον στρ[ογγ]|ύλα. The use of three-dimensional templates was one way of achieving such accuracy and uniformity. A simpler way, cited by Garlan 363 n.64*b*, is exemplified by the masons' marks on what survives of an isolated round tower built on Crete in or after the fourth century: 'an incised line, visible in places about 0.10 [m.] from the edge of the upper foundation course, formed a circle exactly 6.17 [m.] in diameter, and evidently marked the edge of the lowest course of the tower itself' (S. Hood, 'A Hellenic fortification tower on the Kefala ridge at Knossos', *ABSA* 52 (1957) 224–228, at 225).

A64.4–5 [*84.27–28*] **διαδοῦναι τοῖς λιθουργοῖς, ἵνα εὐεργῶς καὶ ταχὺ ἐργάζωνται** ('to give to the stonemasons, in order that they may work efficiently and quickly'). The first adverb in the ἵνα clause has been queried in the past, with Brinkmann ap. Schoene suggesting ἐνεργῶς and Schoene himself εὐχερῶς. Both are very much more common than εὐεργῶς, and εὐχερῶς in particular has the attraction of being an established part of Ph.'s usage (A51.3 [*83.36*], A52.3 [*83.40*], C14.13 [*92.8*], C16.3 [*92.17*] and D19.3 [*98.19*]); nevertheless εὐεργῶς is transmitted in all manuscripts and has a parallel in the sort of philosophical vocabulary that Ph. does occasionally invoke (Aristot. *Meteor.* 3.377b25–26).

For *lithourgoi* engaged in practical wall-building (as opposed to sculpture *vel sim.*) cf. e. g. Thuc. 4.69.2 (ones from Athens are sent to the Megarid to build a blockading wall round Nisaia, 424) and 5.82.6 (carpenters and masons from Athens help to build the long walls of Argos, 418 – also in Plut. *Alc.* 15.5); Aristoph. *Av.* 1134 (the generic craftmen who did not build the birds' enormous city wall are an Egyptian πλινθοφόρος, a λιθουργός and a τέκτων).

A65.1–3 [*84.28–30*] **καὶ ἔσονται οὕτως συνεχῶς οἰκοδομούμενοι μάλιστ' ἰσχυροί** ('and built thus in series (the towers) will be particularly strong'). The adverb συνεχῶς had been used in *Bel.* 70.11 & 21 of bronze plates being continuously beaten into shape. In the present context, associated with οἰκοδομούμενοι, its sense is less obvious – as, too, are some translations of it, such as 'sans interruption' (Graux 143). Lawrence 85 translates 'consistently', which perhaps conveys more than Ph. intended. My own translation follows Garlan 298 ('en série').

Immediately after οἰκοδομούμενοι the manuscripts have πόλεις τε ('and cities'), which Schoene retained. Buecheler ap. Schoene proposed τὰ πλεῖστ' εἰσχυροί (sic); Diels ap. Schoene suggested but later abandoned ἄλλως τε ἰσχυροί; μάλιστ' is printed in Diels-Schramm 33 and accepted by Garlan 298.

A65.4–6 [*84.31–33*] **διὰ <τὸ> τῶν πετροβόλων τὰς πληγὰς παραφόρους συμβαίνειν καὶ μὴ εἴκειν τοὺς λίθους μηθέν** ('because the blows of the rock-projectors are made to deviate and the stones will not give way at all'). Cf. Vitruv. 1.5.5: *in rotundationibus autem uti cuneos ad centrum adigendo laedere non possunt.*

'Because of these characteristics, circular and semi-circular towers were often used at exposed points in Greek circuits': so Marsden, *Developments* 144, citing the 'very good example' of the improvements made in the early 270s to the defences on the Aspis hill at Argos – the addition (to the older, oval circuit) of a triangular salient with a large semicircular artillery tower at its tip. On this cf. Garlan 367 fig.61, and the Comm to A55 **Εὐχερεστάτη** and A84 **ἡ δὲ λοξά**.

A66.1 [*84.34*] **Λεῖ δὲ τοὺς γωνιαίους καὶ τοὺς ἔξωθεν τιθεμένους κτλ** ('the stones at the corners and the ones being placed on the outside etc.'). The paragraphing in Graux 142 indicates that in his opinion A66 [*84.34–36*] stands alone, as a generalization offered implicitly (unlike A67–68 [*84.36–42*] and A69–75 [*84.43–85.21*], where, respectively, Τῶν δὲ βαρῶν καὶ τῶν πύργων <u>πάντων</u> and ἐν <u>πάσαις</u> ταῖς τειχοποιίαις, make this explicit). I have followed the majority view that A66 be-

longs with A64–65 [*84.24–34*] and is thus a point being made about the semicylindrical towers only. On that basis, the second of these two categories of stones is easily visualized, even without the help of Diels-Schramm 34 fig.16 (which also depicts the security features mentioned in A8 [*80.5–11*]). As to τοὺς γωνιαίους (λίθους), since such towers have themselves no angles or corners I agree with Rochas d'Aiglun (n.74) that they must be those angles formed where the tower meets the curtain.

These stones, Ph. says, should be the largest and thickest available, and *akrotomoi*. Missed by Arnim, *Index* (who only registers τὰ τῶν σφηνῶν ἀκρότομα, 'the offcuts of the wedges' in *Bel.* 67.23), the exact sense of the adjective in this context is left unclear by lack of parallels. Garlan's 'en roche très dure' (298: taken over from Graux 143) does not seem to me a close enough reflection of the etymological elements in ἀκρότομος. It is harder to adjudicate between the interpretations of Diels-Schramm 34, whose fig.16 (see already above) depicts each stone with a flat front and bevelled edges, in accordance with their translation 'kantig (d.i. mit Randschlag)', and of Lawrence 85, who translates 'cut to a peak' and suggests in support of this that ἀκροτόμους here might be an exact equivalent of ὀξεῖς in A11.5–6 [*80.23–24*]); however, ὀξεῖς there might also be another way of describing the protruding bossing of A29.3–6 [*81.49–82.1*], which does not really seem to be what Ph. is talking about here in A66.

A67–68 [84.36–42]: outworks of towers

A67.2–3 [*84.37–38*] **τοίχους ἀπτομένους ἄκρων τῶν γωνιῶν** ('spur-walls attached to the tips of the corners'). The archaeological evidence shows no instances of this specific feature (Garlan 363, Lawrence 84), but see under the next lemma.

The noun ὑπόστασις, already used concretely in A60.1–3 [*84.8–10*] (q.v. above), has an abstract sense here in the phrase ἵνα ὑπόστασιν ἔχωσιν οἱ κινδυνεύοντες (A67.3–4 [*84.38–39*]) and again in ἵνα ὑπόστασιν τοῖς ἐναντίοις μὴ ἔχῃ at A75.3 [*85.21*].

A68.1–2 [*84.39–40*] **προτειχίσματα περὶ αὐτοὺς καὶ χάρακα κατασκευάζειν** ('to provide outworks round them and a palisade'). Schoene accepts the transmitted ᾗ χάρακα; Diels's καί, surely correct, is printed in Diels-Schramm 34 and Garlan 298.

'A series of low remains, explicable by this sentence, can be seen to have enclosed at least the outward part of a tower at Demetrias' (Lawrence 84). See also Garlan 364 n.68*a* for this and other instances, including another nearby in Thessaly: the site subsequently known as Goritsa.

A68.3–4 [*84.41–42*] **μὴ ὑπορύττωσιν αὐτοὺς προστιθέντες τὰς δοκίδας** ('they may not put forward their screens and undermine the (towers)'). Graux wanted to supply an explicit αὐτοὺς <τοὺς πύργους>; no-one else has considered this necessary.

On undermining see under A1 **μηδ' ὑπορύττηται**; on screens see under A22 **καταγνύωσι**.

A69–78 [84.43–85.35]: general outworks

A69.1–2 [*84.43–44*] **Ὀρυκτέαι δέ εἰσιν ἐν πάσαις ταῖς τειχοποιίαις οὐκ ἐλάττους τριῶν τάφρων** ('No fewer than three trenches are to be dug in all fortification-systems'). A statement welcome for its clarity, after the many obscurities of the preceding chapters. Ph.'s ideal of 'no fewer than' three concentric trenches – compare A83.4 [*86.1*]: 'as many as possible' – appears to find an echo, much later, in *De obsidione toleranda* 40–41: Πρὸς ἐπὶ τούτοις καὶ τὰς τάφρους ὑπορύσσειν καὶ εὐρυτέρας ποιεῖν λ΄ πήχεων, εἰ ὁ τόπος ἀπαιτεῖ, εἰς πλάτος καὶ εἰς βάθος ὡσαύτως· εἰ δὲ καὶ δύο ἢ καὶ τρεῖς ἐγχωρεῖ γένωνται [*sic*], <ταύτας ὀρύσσειν> ἐμπιπλᾶν τε αὐτὰς ὕδατος στρατηγικώτερον. (Contrast Syrianus Magister 12.37–55, who seems satisfied with a single *taphros*.) The ideal was rarely attained, however. A known instance manifested by archaeological remains is the final stage (third quarter of the third century) of Syracuse's Euryalos fortress: see esp. F.E. Winter, 'The chronology of the Euryalos fortress at Syracuse', *AJA* 67 (1963) 363–387, condensed in Winter, *Fortifications* 280–283, 330; also Garlan 364 n.69*a*, cf. 184–189; Marsden, *Development* 119–120; Lawrence 84, 288–299; Adam, *L'architecture* 113; McNicoll, *Fortifications* 5, 14. With this it is customary to associate the description of Sirynx, the capital of Parthian Hyrkania, successfully attacked by Antiochus III in 210/09 (Plb. 10.31.8, with HCP 2.241–242, including the widely divergent modern attempts to locate it in the plains south of the Caspian Sea): Τάφροι γὰρ ἦσαν τριτταί, πλάτος μὲν οὐκ ἔλαττον ἔχουσαι τριάκοντα πηχῶν, βάθος δὲ πεντεκαίδεκα· ἔτι δὲ τοῖς χείλεσιν ἑκάστης ἐπέκειτο χαρακώματα διπλᾶ καὶ τελευταῖον προτείχισμα δυνατόν. According to Diod.Sic. 16.44.5, Sidon when attacked by the Persians in 351/0 had a triple-trench system in place. For single trenches see Winter, *Fortifications* 275–276; Lawrence 279–288.

There are one or two examples of (single) trenches which were in fact moats, filled with water. Famously, Mantineia when re-founded by the Thebans in 370 furnished itself with such a thing, by the expedient of dividing the course of the R.Ophis (Winter, *Fortifications* 272–273; Garlan 191; Adam, *L'architecture* 176–177); and on the moat parallel with the north wall at third-century Paestum see e.g. Lawrence 280–281 with fig.49 and Adam, *L'architecture* 114 fig.78. But far more usually – and certainly in Ph.: see A36 [*82.28–32*] – the trench or trenches would be dry. (Likewise, implicitly, Vitruv. 1.5.6. Contrast the *De obs. tol.*, quoted above, and Veget. 4.5.)

See generally Adam, *L'architecture* 112–114, and further under the next lemma.

A69.2–5 [*84.44–47*] **ὧν δεῖ τὴν μὲν πρώτην ἀπέχειν ἀπὸ τοῦ τείχους πλέθρον, τὴν δὲ δευτέραν ἀπ' αὐτῆς πήχεις μ΄, τὴν δὲ τρίτην ἴσον ἀπὸ τῆς δευτέρας** ('the first of them must be a plethron (30.8 m.) away from the wall, the second 40 cubits (18.48) from this (first trench), the third an equal (distance) from the second'). It can be presumed (with Lawrence 84) that all three of these gaps are calculated to the inward edge of the trench. Schemas, essentially the same though varying in their details, are offered by Diels-Schramm (35 fig.17), Marsden (*Development* 91 fig.2) and Garlan (364 fig.59, reproduced as Adam, *L'architecture* 114 fig.79).

For a distance of 'a plethron' in a context of fortifications cf. Maier no.35 (fragmentary decree about the city walls of Megalopolis, ?second century), lines 11–12:

τάφ]ρον καὶ πύργον κεκλαρωμέ|[νοι εἰσίν – – – ὧν μῆκος οὐκ ἔ]στι ἔλασσον ἢ πλέθρον. See also e.g. Diod.Sic 14.18.5 on the fortification of Epipolai, Syracuse, by Dionysius I in 401: to each plethron is assigned a builder (*oikodomos*) and two hundred labourers.

A70.1–4 [*84.47–50*] **Ἀνὰ μέσον δὲ τῶν διαστημάτων ἐπὶ εἴκοσι ὀκτὼ πήχεις τὸ πλάτος σκόλοπας καταπῆξαι καὶ ὀρύγματα ποιῆσαι καὶ παλίουρον φυτεῦσαι** ('In the middle of the (two intervening) spaces, over a breadth of twenty-eight cubits (12.936 m.), (it is necessary) to fix stakes and to create excavations and to plant a thorn-hedge'). In other words, the enemy will encounter this tripartite obstacle for two such distances, one immediately after the outermost trench and one immediately after the middle one.

Fixing stakes amounts to erecting a palisade; cf. A37–38 [*82.32–42*], where *inter alia* the term 'stake', σκόλοψ, has already been used. (For the idiom σκόλοπας καταπῆξαι cf. e.g. Hdt 9.97.) Excavations (ὀρύγματα) – more usually encountered as an offensive than a defensive tactic – are mentioned again in D43.3–5 [*100.4–6*] (on the attackers' counter-measures), with the extra information that they are concealed, so as to act as booby-traps.

The term παλίουρος, again in A77 [*85.29–32*] and D50 [*100.22–25*], I have translated in the generic way indicated (cf. Diels-Schramm 34, 'Dornhecken'), though it is possible that Ph. meant by it something more botanically distinct: Christ's-thorn ('épines du Christ': Garlan 364 n.70*a*) or 'Jerusalem-thorn' (Lawrence 85). See generally LSJ s.v., and K.D. White, *Farm Equipment of the Roman World* (Cambridge 1975) 26.

Geop. 5.44.1 cites Diophanes (a first-century epitomator of Cassius Dionysius's translation of the second-century Carthaginian farming manual by Mago: see Dalby, *Geoponika* 41) to the effect that good growth in a hedge newly-planted at the vernal equinox can be achieved by treating the shoots with a honey-soaked mix of various seeds and fruits, including those of the Christ's-thorn.

A70.4–6 [*84.50–85.1*] **ἵνα τῷ ταλαντιαίῳ πετροβόλῳ θέσιν μὴ ἔχωσι, ἐὰν τῆς πρώτης τάφρου κρατήσωσιν οἱ πολέμιοι** ('in order that the enemy may not have a position for the one-talent (26 kg.) rock-projector, if they gain control of the first trench (they come to)'). Ph.'s second mention of enemy petroboloi of this calibre (for the first, see under A29 **διεστηκότες**), and with the extra information about them now added, in A70–73 [*84.47–85.13*], it becomes even more clear that (i) they were the largest and most powerful ones likely to be encountered in normal circumstances and that consequently (ii) they were the weapon *par excellence* that extramural military infrastructure of the kind advocated here needed to neutralize. 'Probably a large stone-thrower had to stand within 150 yards [= 137.16 m.] of a wall to be effective, the machine being forced to shoot at a very low angle of elevation so that its shot would have the maximum possible forward momentum': so Marsden, *Development* 90–91. Ph.'s scheme denied it that range and capacity, whether calculated from the exterior edge of the outermost trench or (on the scenario envisaged, with the first trench overcome) the beginning of the first set of obstacles. (The defenders on the other hand, as Garlan 364–365 n.70*c* observes, could expect to deploy their own artillery effectively over that distance, bolt-firers at any rate, because they were firing from higher positions.)

McNicoll, *Fortifications* 5 argues for considerably longer ranges of fire than in Marsden's calculations; however, as Milner's addendum there suggests, he does not draw a consistent distinction between sheer range and actual destructive impact, especially on walls.

A71.1–2 [*85.1–2*] **δώδεκα γάρ ἐστι πηχῶν τοῦ ταλαντιαίου πετροβόλου ἡ σύριγξ, ἡ δὲ σκυτάλη δ΄ πηχῶν** ('for the tube of the one-talent rock-projector is twelve cubits (5.544 m) (long), and the handle 4 cubits (1.848 m.)'). These technical details are not integral to Ph.'s argument here, which would simply have required him to say – if it were not self-evident – that the *talantiaios petrobolos* was large, of a size commensurate with its ammunition. But the author of *Bel.* knew the facts and chose to give them, exactly. The length that can be generated by taking the figure of 20 dactyls for the spring diameter of a *talantiaios* (*Bel.* 51.42, as adjusted: Marsden, *Treatises* 158) and applying the standard palintone multiplier of 19 (see e.g. Rihll, *Catapult* 290–291) results in 380 dactyls. This corresponds very well indeed with the present passage, provided the handle (on which see below) is included in the calculation: sixteen cubits = 384 dactyls.

Ph.'s only fault here, accordingly, lies in his imperfect grasp of the appropriate terminology. He is correct to speak of the handle or handspike, σκυτάλη in the sense registered by LSJ s.v. I.7, Latin *scutala*. The word has already appeared in *Bel.* (61.47, 68.6, 74.5, 76.12); see also Hero, *Bel.* 13.5, and generally Marsden, *Development* 34. But σύριγξ – in this sense: LSJ s.v. II.7 – is a term, strictly speaking, which belongs to the vocabulary of bolt-firers rather than rock-projectors: see e.g. Marsden, *Development* 5, 10, 17 ('case'); Garlan 220 ('coulisse'); D.B. Campbell, *Artillery* 3–4 ('pipe'). In the construction of lithoboloi/petroboloi, Ph.'s topic here, designers 'discarded the case (σύριγξ) in favour of the 'ladder' (κλιμακίς), so called because of its resemblance to an ordinary ladder [κλίμαξ]. The need to reduce the total weight of stone-throwers inspired the change': Marsden, *Development* 23. Ph. did know the term κλιμακίς, and likewise uses it in *Bel.* (four times in 54.7–28), but forgets it here; cf. Diels-Schramm 36 n.1.

A71.3–4 [*85.3–4*] **ὥστε παράστασιν οὐχ ἕξει τοῖς περιάγουσι τὸν ὄνον** ('which will result in no standing-room for the men turning the winch round'). For *parastasis* in this sense cf. Diod. Sic. 20.91.2, on such standing-room (for the pushers) inside Demetrius Poliorcetes's helepolis at Rhodes.

The idiom περιάγειν τὸν ὄνον has already appeared in *Bel.*74.5, though with the diminutive of the noun – περιάγοντα ταῖς σκυτάλαις τὸν ὄνισκον – that is preferred throughout that work (and in similar contexts in other poliorcetic writers: see e.g. Athen. Mech. 14.7, with Whitehead and Blyth, *Athenaeus* 105).

A72.1–3 [*85.4–6*] **Ποιητέον δ' ἐστὶ τὰς τάφρους ὡς βαθυτάτους καὶ μὴ ἔλαττον τὸ εὖρος ἑβδομήκοντα πήχεων** ('The trenches are to be made as deep as possible and not less than seventy cubits (32.34 m.) in width'). According to Plb. 10.31.8, the ones at Sirynx – above under A69 '**Ορυκτέαι** – were fifteen cubits (6.94 m.)

deep. Other figures in literary sources and those obtainable from archaeology (Garlan 365 has a summary dossier of evidence, mainly from Magna Graecia) range very widely, between shallow trenches of 2–4 m. at Athens and elsewhere to the massive one at Lilybaeum (present-day Marsala) in Carthaginian-held western Sicily; it held out against the Romans for nine years in the 240s, and Diod.Sic. 24.1.2 reports the trench there (simply described in Plb. 1.42.7 as 'deep') as forty cubits (18.5 m.) deep, and sixty (27.74) wide. At Halikarnassos in 334 Alexander the Great encountered a *taphros* 'about thirty cubits [13.87 m.] wide and fifteen [6.94 m.] deep', according to Arr. *Anab.* 1.20.8, who adds however that Alexander had no difficulty in filling it in. (See generally, next lemma.) One wonders why Ph. did not specify a minimum depth (rather, A83.4 [*86.1*] repeats 'as deep as possible'), or say that depth could to a certain extent offset width. Instead, his minimum stipulation for width is an "ideal" figure not matched in any of the other evidence. (The corresponding figures in Syrianus Magister 12.38–42 are a width of no less than forty cubits, and a depth equal to or greater than the depth of the wall's foundations.)

A73.2–3 [*85.7–8*] **οὔτε χωσθήσεταί <τις> ταχέως** ('there will be no filling-in <of any> quickly'). The (standard) supplement is by Alfred Schoene ap. Schoene; cf. ἐάν τινες αὐτῶν χωσθῶσιν in A73.6–7 [*85.11–12*].

Filling trenches in, naturally, was the usual way that attackers dealt with them (and often by men working under the protection of filler tortoises, χωστρίδες χελῶναι). See already A36 [*82.28–32*], and again D10.7–11.5 [*97.25–34*], D39 [*99.41–44*] and D56 [*100.44–46*].

A73.3–4 [*85.8–9*] **ὅς ἐστι σφροδρότατος** ('which is very powerful'). See above under A29 **διεστηκότες** and A70 **ἵνα**.*

A73.5 [*85.10*] **ἢ ἔκλυτος ὢν ἀντιτυπτήσει** ('or will strike it with no force'). Marsden, *Development* 90 takes issue with the LSJ translation of ἔκλυτος in this passage ('deprived of force'), objecting that 'there is obviously no question of the power of the engine being affected. It just could not find a sufficiently large and stable platform'. His own translation of the whole phrase, accordingly, is 'or, being deprived of support, will topple over'. McNicoll, *Fortifications* 5 n.32 objects that this 'does not seem sensible', without further comment. My own comment would be that Marsden's interpretation requires ἀντιτυπτήσει to have an odd, intransitive sense that it surely cannot have; and in any case, after ἢ οὐκ ἀφίξεται πρὸς τὸ τεῖχος, an acceptable second alternative is that the wall *is* reached but not with any destructive force.

* Garlan 299 marks a note here, A73*a*, but it does not appear at 365 (or anywhere else). And this phenomenon of ghost notes occurs seven more times: B25b (303) missing from 371; C53d (313) missing from 389; C56a (313) missing from 391; C57c (314) missing from 391; C67a (315) missing from 392; C70a (315) missing from 382; D80b (324) missing from 403.

A73.5–6 [*85.10–11*] **αἵ τε στοαὶ οὐ πλησιάζουσι τῇ πόλει** ('and that stoas will not come close to the city'). See above under A50 **τὰς προσῳκοδομημένας στοάς**.

A74.1–3 [*85.13–15*] **Ὀρύττοντας δὲ δεῖ τὰς τάφρους τῆς μὲν πρώτης τὴν ἀναβολὴν ποιεῖσθαι τοῦ χοῦ πρὸ τοῦ τείχους** ('It is necessary for those digging the first of the trenches to create the excavation's mound in front of the wall'). After A70 [*84.47–52*], where the 'first' of the three trenches is the first one the enemy reaches, A74–78 [*85.13–35*] resume the defenders' perspective of A69 [*84.43–47*].

For ἀναβολή in this sense cf. e.g. Xen. *Anab.* 5.2.5 on the fort of the Drilai [BA map 87 grid E4] encountered by the Ten Thousand (τάφρος ἦν περὶ αὐτὸ εὐρεῖα ἀναβεβλημένη καὶ σκόλοπες ἐπὶ τῆς ἀναβολῆς κτλ); Diod.Sic. 17.95.1 on Alexander the Great's 'gigantic camp, all dimensions of which were of more than human size' (Bosworth in HCA 2.356) at the R. Hyphasis in 326/5 (ὤρυξε τάφρον τὸ μὲν πλάτος πεντήκοντα ποδῶν, τὸ δὲ βάθος τεσσαράκοντα· τὴν δ' ἀναβολὴν ἐντὸς τῆς τάφρου σωρεύσας τεῖχος ἀξιόλογον ᾠκοδόμησε).

A75.1–3 [*85.19–21*] **θετέος δέ ἐστι πρὸ τῆς δευτέρας καὶ τῆς τρίτης ἄνευ προτειχισμάτων ὁ χάραξ, ἵνα ὑπόστασιν τοῖς ἐναντίοις μὴ ἔχῃ** ('but the palisade which is to be placed in front of the second and the third (trenches) should have no outworks, in order that there would be no support for the opponents'). For 'support', ὑπόστασις, cf. A67 under **τοίχους**. Here it is denied to the enemy by placing the palisades on what A81.3–4 [*85.43–44*] will call the (inner) lips of these trenches; see the Comm. thereto.

Garlan 365 reasonably cites for comparison Plb. 10.31.8 on the Sirynx trench-system – see already under A69 **Ὀρυκτέαι** and A72 **Ποιητέον** – though there all three of the trenches are treated in the same way (and with 'double palisades', χαρακώματα διπλᾶ, which, given the plural ἐπὶ τοῖς χείλεσιν ἑκάστης, might mean one each at the outer and inner lips).

A76.1–2 [*85.22–23*] **συναγαγόντας παρά τε τῶν πολιτῶν καὶ δημοσίᾳ κεράμια** ('to collect pots both from the citizens and at public expense'). Garlan 299 is wrong to translate 'fournies par les citoyens *ou* aux frais de la communauté'; Ph. speaks of twin (τε…καί) sources of supply.

See further under the next two lemmata; and on δημοσίᾳ see B1 under **δημοσίᾳ**.

A76.3–4 [*85.24–25*] **σάξαντας τὰ στόματα φύκει· ἄσηπτον γάρ ἔστι** ('having stuffed their mouths with seaweed, for it is impervious to rot'). The first of five mentions of this commodity, assumed by Ph. to be readily available to both sides; see also B52.4 [*90.11*], C4.2 [*91.10*] (as corrected to φύκους from the transmitted φυλάκους/θυλάκους: see the Comm. there), D34.4 [*99.24*] and D51.5 [*100.29*].

A76.7–8 [*85.28–29*] **τὰς δὲ προαγομένας χελώνας καὶ μηχανήματα ἐπ' αὐτῶν καταδύνειν** ('but the tortoises being brought forward and machines sink down onto them'). Graux wanted to emend the participle from προ- to προσ-, the compound Ph. uses elsewhere, but nobody has followed him (either in that or in his deletion of ἐπ' αὐτῶν).

In essence this tactic has its origin in Aen.Tact. 32.8, which likewise recommends the excavation (in secret) of holes designed to immobilize enemy 'machines': πρὸς δὲ ταῦτα τὰ μηχανήματα πρῶτον χρὴ τοὺς ἐν τῇ πόλει κρυφαίως ὑπορύσσειν κατὰ τὰς προσαγωγὰς τοῦ μηχανήματος, ἵνα οἱ τροχοὶ τῶν μηχανημάτων ἐμπίπτοντες δύνωσιν εἰς τὰ ὑπορύγματα. (A second line of defence is an intramural (ἔσωθεν) barricade.) Even under Aeneas's plan the holes must surely have been filled with something, to prevent their premature collapse, but only Ph. explicitly advocates pots for this purpose.

Ph.'s scheme is mentioned, from the attackers' standpoint, in *Par.Pol.* 209.10–212.6 (part of **Appendix 3**, passage no.4); and Ph.'s D43.3–5 [*100.4–6*] tells attackers how to attempt to counter it. An episode from c.480 had made it famous: doing exactly this near Hyampolis, the Phocians had destroyed the Thessalian cavalry (Hdt. 8.28; Paus. 10.1.3; Polyaen. 6.18.2). Note also Lawrence 86 and (more fully) 281 on the huge pot, more than 2 m. tall, buried upright in the *taphros* at Athens, probably in the second half of the fourth century; cf. generally R.E. Wycherley, *The Stones of Athens* (Princeton 1978) 21–22.

Another means to the same end is exemplified in the accounts of a Rhodian defence-measure against the helepolis of Demetrius Poliorcetes in 304 (Athen. Mech. 27.2–6, with Whitehead and Blyth, *Athenaeus* 134–138): see, variously, Vitruv. 10.16.4–8 and Veget. 4.20.

A77.1–3 [*85.29–31*] **Πολλαχοῦ δὲ ὀρυκτέον καὶ τέλματα, περὶ ἃ παλίουρον δεῖ φυτεύειν** ('In many places ponds, too, are to be dug, round which it is necessary to plant a thorn-hedge'). On τέλματα see generally Winter, *Fortifications* 270–272. He translates *telmata* as 'ditches', which does not seem to reflect its literary usage in general (see LSJ s.v.) or be apt, in particular, for this passage of Ph. (where a little later [274] he renders it 'marshy areas'); nevertheless he is justifiably dubious as to whether *telmata* which are attested near gates at Athens (a '*horos* of Athena's *telma*': Wycherley, *Stones* 21, 200 fig.59.1) and Thasos were of any military significance.

Polybius (5.46.12–47.2) recounts an episode where naturally-occurring *telmata* are injurious to Molon's forces in Mesopotamia in 222, but I am not aware of instances in which, as Ph. advocates here, they are purpose-built by defenders.

For planting thorn-hedges see already A70 under **Ἀνὰ μέσον**.

A78.2–3 [*85.33–34*] **ὀρθῶς ἔχουσας ὁδοὺς ἁμαξηλάτους ἱκανάς** ('enough roads straight across that wagons can use'). Cf. very generally Aen.Tact. 16.15, with the phrase ἁμαξηλάτους ὁδούς in the ancedote in the preceding chapter. (I cannot discern, *pace* Garlan 366 n.78*a*, any significant link with Aen.Tact. 39.1–2, which concerns an emergency tactic when the enemy is already at the gates.)

Winter, *Fortifications* 274 n.17 comments that '[p]resumably ὁδοὺς ἁμαξηλάτους denoted a passage of sufficient width for wagons to pass abreast. The bridges across the ditch at Selinus were *ca.* 3.20 m. wide'. If so, Ph. took the point for granted without feeling the need to spell it out. Contrast Thuc. 1.93.5 on the Themistoclean walls of Peiraieus: Καὶ ᾠκοδόμησαν τῇ ἐκείνου γνώμῃ τὸ πάχος τείχους ὅπερ νῦν ἔτι δῆλόν ἐστι περὶ τὸν Πειραιᾶ· δύο γὰρ ἅμαξαι ἐναντίαι ἀλλήλαις τοὺς λίθους ἐπῆγον. (Lawrence 233 with n.3 revives the heterodox view of J.E. Powell that what is being described there is two wagons hitched end-to-end, but see HCT 1.263 with n.1.) Note also Aristoph. *Av.* 1125–1129 on the fantasy wall in the birds' city: it is wide enough for two boastful Athenians to pass in opposite directions in their chariots, even if drawn by horses as large as the Trojan.

See also A81 [*85.41–46*].

A79–80 [85.35–41] (misplaced): equipment for repelling close-quarter attacks

A79.1–2 [*85.35–36*] **<…> χρήσιμοι δέ εἰσι καὶ κτλ** ('<…> and also useful are etc.'). A79–80 [*85.35–41*] as a whole are misplaced here, interrupting a topic that ought to have proceeded directly from A78 [*85.32–35*] to A81 [*85.41–46*]. Graux 148 wondered whether they might belong after B53 [*90.14–24*]. My own suggestion would be before C39 [*94.1–6*]. Be that as it may, Schoene's opinion that lacunae need to be posited both at the beginning and at the end of this material is agreed by all.

A79.2 [*85.36*] **οἱ τρίβολοι, οἷς ἀλοῶσι** ('*triboloi*, (of the kind) with which threshing is done'). For *triboloi* see also C41 [*94.8–10*], C51 [*94.36–40*], C55 [*95.5–9*], D44 [*100.6–11*], D47 [*100.14–16*], D49 [*100.20–22*] and D104 [*104.19–21*]. I retain the Greek word itself, transliterated, in all these passages because of the difficulty of finding satisfactory English equivalents for some relevant applications of the term. Diels-Schramm 37 n.1 (with fig.18) elucidate admirably: 'τρίβολοι gibt es in 4 Arten. 1. Der fünfellige Tribolos (λάμβδα) diente zum Aufhalten der von hochgelegenen Festungswerken abgelassenen Wagen, Rädern und runden Steinen […]. 2. Der Mauertribolos diente zum Abschwächen der Widderstösse und Geschossaufschläge gegen die Mauern. 3. Die Fussangel diente zum Ungangbarmachen kleiner Geländestrecken, besonders der Breschen. 4. Das Brandgeschoss (Feuerlanze), harpunenähnlich, je nach Grösse und Form mit der Hand, Pfeilgeschützen oder Steinwerfern geworfen, diente zum Anzünden von Angriffs- under Verteidigungsmaschinen und Gerät aller Art'. (The classification in LSJ s.v. τρίβολος is unhelpful by comparison: see further below.) Here in Ph. the type most often at issue is no.4, the incendiary missiles (explicitly in C41, D49 and D104; implicitly in C55); and no.3, caltrops, is what must be envisaged in C51 and D44.

That leaves the present passage, together with its counterpart (from the attackers' perspective) D47. (LSJ s.v. τρίβολοι (sic) misses the connection, classifying D47 separately.). Here what we have is Diels-Schramm's no.2, which they call the Mauertribolos: the tribolos 'with which threshing is done', as Ph. himself puts it. Though attested elsewhere in Greek (e.g. in the epigram AP 6.104.3, τριβόλους ὀξεῖς ἀχυρότριβας), it is perhaps better known as Latin *tribulum*, a word used by Varro, Vergil, Pliny and others; Servius on Georgics I.164 (*tribulaque traheaeque*) refers to its 'teeth' (*tribula genus vehiculi omni parte dentatum, unde teruntur frumenta*), reminiscent of the various prickly plants also called *tribolos/tribulus*; and the overall definition in Lewis & Short is 'a threshing sledge, consisting of a wooden platform studded underneath with sharp pieces of flint or with iron teeth'.

A79 as a whole [*85.35–39*] seems in general terms to be inspired by Aen.Tact. 36, which also concerns defensive counter-measures against enemy troops who are scaling the walls; and, specifically, the use of *triboloi* of this kind is a tactic which begs comparison with the one in §2 there, involving a sort of door-panel placed under a ladder so as to destabilize it. See further under the next lemma.

A79.2–3 [*85.36–37*] **αἱ ἀγκυρωτοὶ δοκίδες καὶ οἱ χηλωτοὶ κοπεῖς** ('hooked (?) poles and notched (?)cutters'). Repelling enemy soldiers as they mount the wall on ladders – see the next lemma – had been the topic addressed in Aen.Tact. 36. Three procedures are recommended. (*a*) If the ladder is higher than the wall, wait until the climber reaches the top and push either him or it away 'with a wooden pitchfork' (ξύλῳ δικρῷ); if the ladder is level with the wall, (*b*) push him off when he is actually crossing it, or else (*c*) anticipate the problem by positioning in advance a sort of door-panel on rollers which can, somehow, slide and dislodge the ladder. If option *c* (which presents interpretative problems of its own: Whitehead, *Aineias* 198–199; Bettalli, *Enea* 326–327) is to be linked, in spirit at least, with Ph.'s *triboloi* (see under the preceding lemma), and if *b* is a self-evident response in the circumstances, we are left with how, if at all, the words of the present lemma relate to Aeneas's pitchforks (and indeed to scenes of this kind in the historical narratives: see e.g. Liv. 28.3.7 on the repulse *furcis*, 'with forks', of Roman ladders brought against the walls of Orongis in 207). Perceiving this is hampered by textual problems and also by Ph.'s vocabulary *per se*.

The first of his phrases, ἀγκυρωτοὶ δοκίδες, is repeated in *Par.Pol.* 261.9 (part of **Appendix 3**, passage no.8), where Sullivan's translation 'poles with anchorlike hooks' aims to capture the etymology of its rare adjective; cf. 'bent like an anchor' (LSJ s.v.). Diels-Schramm 38 condense adjective and noun into the term 'Ankerstangen'. I have borrowed 'poles' from Lawrence 87 (and Sullivan, above). It might nevertheless be that what Ph. had in mind by *dokides* was something squarer and flatter (cf. D47 under **Πρὸς δέ**), but see further below.

The phrase χηλωτοὶ κοπεῖς embodies the emendation by Buecheler of the transmitted participle κοπέντες to the noun κοπεῖς (for which cf. Diod.Sic. 1.35.10 on Egyptian hippopotamus-hunting with harpoons, ὥσπερ τισὶ κοπεῦσιν ἐπὶ σιδηροῖς ἀγκίστροις); both Diels-Schramm 38 and Garlan 299 adopt it. (Schoene had retained the dubious κοπέντες, while noting in his apparatus Diels's one-time suggestion of the noun καμάκες, 'shafts'.) Ph.'s adjective χηλωτός is a *hapax legomenon*, but it is evidently cognate with the verb χηλοῦν, which he had used at *Bel.* 77.8 to describe the notching of catapult-missiles; cf. ἀχήλωτος at 73.43, 75.35, 75.37 and 77.6, and a χεὶρ … κεχηλωμένη in Hero, *Bel.* 30.10–11 & 20–21.

Bearing all this in mind, I find merit in the conception of Diels-Schramm 38, depicted in their fig.19, of how the two implements mentioned here by Ph. differed from each other: the *dokis* has a hook (or hooks?) whose point faces the user; the *kopeus* has a pair of outward-facing ones. (If this is correct, the latter could perform Aenean "pitchfork" functions as well as any actual cutting or cleaving.)

A79.3–5 [*85.37–79*] **πρὸς τὸ κωλύειν καὶ ἐκτραχηλίζειν τὰς προστιθεμένας κλίμακας** ('with a view to thwarting and overturning the ladders that are being brought up'). The paradosis is secure, and duly printed in all the editions; note nevertheless the ingenious alternative of Buecheler ap. Schoene for the first of these infinitives, κολούειν (curtail, cut short).

The second of them deploys a verb 'prop. of a horse, *throw the rider over its head*' (LSJ s.v., citing Xen. *Cyrop.* 1.4.8 and Plut. *Mor.* 58F), which more generally means breaking someone's neck (especially in Aristophanes: *Nub.* 1501, *Lys.* 705, *Plut.* 70). In the present instance I have borrowed 'overturn' from LSJ, in line with the neutral equivalents adopted by previous translators ('hinabwerfen', Diels-Schramm 38; 'renverser', Garlan 300; 'dislodge', Lawrence 87); it is nevertheless possible that Ph.'s colourful choice of vocabulary was intended to convey the idea of "beheading" or "strangling" the ladders.

A80.1–2 [*85.39–40*] **Δεῖ δὲ καὶ μηχανήματα ὑπότροχα ὑπάρχειν, μάλιστα μὲν β΄, εἰ δὲ μή γε ἕν** ('It is also necessary to have wheeled machines – ideally 2; if not at any rate one'). Not only the wheels *per se* but also (as Garlan 366 n.80*a* comments) the wide intramural perimeter road Ph. has recommended in A10 [*80.16–19*] will contribute to their capacity to be moved to where they are needed. McNicoll, *Fortifications* 14 assumes that they would then be located on walls and in towers. The assumption is perhaps arbitrary, at least as a generalization, but one can agree that ramps (as in the southern cross-wall at Miletos) would be needed if and when this had to happen.

A81–83 [85.41–86.2]: general outworks, resumed

A81.2 [*85.42*] **παρόδους καὶ διόδους ἀσφαλεῖς** ('secure ways along and ways through'). These two terms have so far appeared separately (e.g. A9–10 [*80.11–19*]) but never together. As a pair in this context they clearly apply to routes running, respectively, alongside the rings of fortification and back-and-forth across them. Compare generally Diod.Sic. 20.23.2–6 on the (unnamed) fortified capital city of King Aripharnes of the Sarmatian Siraces, attacked by Satyros in 310.

As regards *diodoi*, Winter, *Fortifications* 279 speculates that the large number of gates in the southern cross-wall at Miletos and in the land walls at Side may have been 'part of a Philonian system of διόδοι between main wall and outworks'; cf. Milner in McNicoll, *Fortifications* 216.

A81.3–5 [*85.43–45*] **ἵνα μὴ οἱ πολέμιοι ἐπὶ τὰ χείλη στήσαντες τῆς τάφρου τοὺς πετροβόλους ἐρύματι χρῶνται** ('in order that the enemy may not stand rock-projectors on the lips of the trench and use it as a stronghold'). The basic image of a trench's 'lips' goes back to Homer (*Iliad* 12.52), and for *taphros* specifically see e.g. Hdt. 1.179.2, Thuc. 3.23.2 & 4, and (quoted above under A69 **Ὀρυκτέαι**) Plb. 10.31.8.

A81.5–6 [*85.45–46*] **καὶ τοῖς πολεμίοις μὴ ᾖ χρήσιμος, ἡμῖν δὲ ἡ ταφρεία** ('and that the entrenchment should not be useful to the enemy but to ourselves'). Ph. repeats here his concern, already voiced in A75.3 [*85.21*] (ἵνα ὑπόστασιν τοῖς

ἐναντίοις μὴ ἔχῃ), that these outworks can be turned to their advantage by the attackers. J. M. Spieser, 'Philon de Byzance et les fortifications paléochrétiennes', in P. Leriche and H. Tréziny (ed.), *La fortification dans l'histoire du monde grec* (Paris 1986) 363–368, at 363–364, cites instances of precisely this happening during the Slavic sieges of Thessalonica in the late sixth and early seventh centuries CE (described, most notably, in the *Miracula Sancti Demetrii*).

A82.3–4 [*85.48–49*] **ὑπὸ γὰρ τῶν λιθοβόλων καὶ στοῶν ῥᾳδίως ἁλίσκεται τὰ τεῖχη** ('for walls are easily taken by stone-projectors and stoas'). On *stoai* in Ph. see generally above, under A50 **τὰς προσῳκοδομημένας στοάς**. The present passage does not lend itself as readily as some others to the interpretation of a Philonian stoa as, consistently, a built structure for protection and/or communication – for if so, how could the ones mentioned here contribute actively to the capture of the city's walls? It has to be a possibility that he is using the term here in the sense of portable *vineae*. Alternatively, the emphasis in his statement is on the *lithoboloi*, with the *stoai* as stationary support for them.

A83.1–2 [*85.49–50*] **Περὶ οὖν ταῦτα φιλοτιμητέον ἐστίν** ('Pride is to be taken in these things, therefore'). This stretch of material culminates in what could be called a purple passage, or the ghost of one. Already in A82.1–2 [*85.46–47*] the phrase Σπουδαστέον δ' ἐστὶν ὡς μάλιστα has invoked the concept of σπουδή, patriotic zeal and the effort it generates (see A28 under **σπουδαστέον**), but here in A83 the psychological stakes are raised even higher. In this passage only (apart from a corrupt one in *Bel.* 56.27–30), Ph. has recourse to the idea of *philotimia*: literally a love of honour; in practice, in the honorific lexicon well understood in Greek cities ever since the classical period, a pride in serving the community and having that service recognized and rewarded. See generally Whitehead, 'Cardinal Virtues' 63–67, and Chaniotis, *War* chap.2 ('Between civic duties and oligarchic aspirations'), esp. 31–32 on honours for those involved in *teichopoiia* (building fortifications in the first place and maintaining them thereafter); cf. Maier 2.40–47, esp. 42–44. More broadly, many of the decrees and other documents in Maier use the vocabulary of *philotimia* etc. of those who have made their mark on *teichopoiia* in private as well as official capacities: see Maier nos.13–16 (Athens), 22 (Eleusis), 23–24 (Salamis), 25 (Sounion), 25 bis (Rhamnous), ?27 (Megara), 30 (Elateia), 33 (Argos), 44 (Paros), 46 (Halasarna), 48 (Telos), 49 (Kamiros), 50 (Potidaion), 60 (Erythrai), 72 (Ephesos), 80 (Istros), 82–83 (Olbia), 86 (unknown provenance), and 87–88 (Odessos). (Post-Maier instances can of course be added: see e.g. SEG 35.1381 bis (Hierapolis), 38.1476 (Xanthos), 47.1646 = 49.1536 (Abdera/Teos).) Additionally, other types of *Mauerbauinschriften* such as lists of contributors and/or officials presuppose this same honorific context and purpose without being expressly couched in its language. See Maier nos.26, 32, 36, 38, 52–53, 69; also (post-Maier) e.g. SEG 32.795 (Olbia), 48.1344 (Pisye, Caria: dockyards), and the Rhodian document cited under A17 **Τινὰ δέ**.

It is perhaps surprising that Ph. does not expressly advocate honours and rewards for such people, as he does for others (see A86 [*86.13–18*], C46–48 [*94.24–31*], D12–13 [*97.34–45*], D68–69 [*101.37–42*] and D96 [*103.39–42*]).

A83.3–4 [*85.51–86.1*] **καὶ αἱ τάφροι ὡς πλεῖσται καὶ βαθύταται γίνωνται** ('(in order that…) the trenches are as numerous and as deep as possible'). Echoed, in essence, in Vitruv. 1.5.6: *primum fossae sunt faciendae latitudinibus et altitudinibus quam amplissimis*.

A84–85 [86.3–13]: the six wall-traces and the terrain they suit

A84.1–3 [*86.3–5*] **Ὀρθῶς δ' ἔχει τὰς τειχοποιίας ποιεῖσθαι προορῶντα τοὺς τόπους· ἄλλη γὰρ ἄλλῃ ἁρμόττει** ('It is good practice to create fortification-systems by observing the terrain beforehand; for one fits here and another there'). For prior observation (προορᾶν) of a site cf. generally Diod.Sic. 20.102.4 on Demetrius Poliorcetes and the Sikyonian akropolis in 303: τὴν ἐπίνοιαν τοῦ βασιλέως καὶ πρὸς ἀπόλαυσιν εἰρηνικὴν καὶ πρὸς ἀσφάλειαν πολέμου δόξαι καλῶς προεωρᾶσθαι.

This general form of words, which introduces the summary mention of six such systems (longer expositions of them having already been given), cannot be intended to exclude the possibility that the same site, and corresponding building-project, might encompass more than one type of ground. '[I]t would be surprising if we encountered a circuit that adhered to a single Philonian *teichopoiia* to the exclusion of all the others. Philo's own advice, προορῶντα τοὺς τόπους, would rather suggest that in each part of the circuit the system best suited to the local terrain should be employed': Winter, 'Indented trace' 425; cf. Winter, *Fortifications* 116 ('Philo intended that the type of trace best suited to existing conditions should be employed in each portion of the circuit. Occasionally it might be possible to use one type of trace throughout; as a rule a combination of two or more types would probably have been required'), and in brief Lawrence 86.

McNicoll, *Fortifications* 4 registers A84–85 [*86.3–13*] under 'Strategic concepts' but comments that 'the emplacement of walls is dealt with only briefly […] and more in a tactical than a strategic sense. Perhaps the need for control of forward ground was so basic that he felt it unnecessary to restate the tenet, although he does warn his reader [in A85 [*86.11–13*], q.v. below] against locating walls where they can be brought under cross-fire. Nevertheless, in an age when artillery was still undergoing change some statement concerning range and efficacy might be expected'. (For what Ph. does say on that topic see A73.3–5 [*85.8–10*].)

A84.3 [*86.5*] **ἡ μὲν μαιανδρώδης τῇ πεδινῇ** ('the meandering one (fits) level ground'). See above under A39 **Ἑτέρα**.

Writing of the Nile above Elephantine, Herodotus says that it is twisting (*skolios*) there 'like the Maeander' (2.29.3); and Strabo 12.8.15, foreshadowing modern usage, calls the plain of the Maeander (present-day Menderes) between Lydia and Caria 'so exceedingly *skolios* that, from it, all twistings are called m(a)eanders'. In the light of these well-known passages and others that could be cited alongside them, it comes as a surprise to find that Ph.'s μαιανδρώδης is a *hapax legomenon*.

It might also, at first sight, seem ill-suited to its role here. If the term – as one applied to an approach to wall-building – had been encountered in isolation, it could have been taken to suggest "natural" twists and turns, of a kind actually

more likely to have been suited to (or determined by) hilly or otherwise difficult ground. (We might then have felt entitled to equate μαιανδρώδης with Latin *sinuosus*, as used in this sort of context by Amm.Marcell. 20.7.17: he describes a Mesopotamian fort thought to have been built by Alexander the Great as *muris velut sinuosis circumdatum et cornutis*. Note also Veget. 4.2: 'the ancients were unwilling to build a wall-trace in straight lines, in case it was exposed to the blows of rams; rather, they enclosed cities *sinuosis anfractibus*'.) Yet the text of Ph.'s phrase here is sound, offering no justification to emend, and the larger context anyway confirms that in his view it is other systems, listed as the sentence proceeds (see the lemmata below), which cater for challenging, irregular terrain of various kinds. 'Les architectes grecs appelaient μαίανδρος un entrelacement de lignes droites se coupant à angle droit; c'est l'ornement que nous nommons aujourd'hui *grecque ou guillochis*': so Rochas d'Aiglun, his statement of the case endorsed in pictorial form by Winter ('Indented trace' 425, repeated *Fortifications* 116 fig.92) and Garlan (366 fig.60). In theory at least, it is the uniformity of the ground which allows for such regularity and repetition in the wall-trace (⎿⎾⎿⎾⎿⎾⎿⎾⎿), and the trace is 'meandering' in this transferred sense; cf. Lawrence 348 (μαιανδρώδης is the term Ph. uses 'because, no doubt, the alternation of salient towers and straight curtains resembled the 'Greek key' pattern – a rectangular stylization of the course of the notoriously winding river'). See now P. Thoenemann, *The Maeander Valley: a historical geography from antiquity to Byzantium* (Cambridge 2011) 31–48, 'maeanders', with a excellent dossier of sources (which does not, however, include Ph.).

With specific regard to wall-traces, Winter, *Fortifications* 116–117 expands as follows: '[t]he τειχοποιία μαιανδρώδης seems self-explanatory. Here the wall did not form a continuous line, but was broken into a series of projecting and recessed portions (Fig.92). Towers would doubtless be placed at the corners of the projections, gateways in recesses. [...] There would have been obvious advantages in such a trace on level ground, where [siege-]towers, rams and mines could most easily be deployed. The threat posed by these devices could be partially averted by ditches, palisades, and advanced artillery-posts. Once these outworks had been carried, however, the enemy had to contend only with fire from the towers of the main rampart. But the recessed portions of the "maiander trace" could not be assaulted without first demolishing the projections that flanked them like great bastions on either side. If the enemy seemed likely to succeed in this undertaking, there would be ample time for the defenders to build one or more new sections of wall behind the original curtains [...]. Thus even after breaching two or three stretches of wall, the attackers might still be faced by a continuous barrier along the line of the recesses in the main trace'.

Despite the confidence of this general, abstract analysis, Winter offers no actual examples here in *Fortifications*, but in 'Indented trace' 425 he makes two suggestions in that regard: Miletos and Side. Concerning Miletos his suggestion is that Ph.'s ἡ μὲν μαιανδρώδης τῇ πεδινῇ might be 'reflected in the trace of the first 200–250 m. of wall extending SW from the Lion Gate. Certainly the ground between the walls and the sea could qualify as πεδινή; and between the salients at each end of

the stretch the trace is broken into a series of projections and recesses'. (McNicoll, *Fortifications* 167 fig.38 is a site-plan.) Winter goes on, however, to concede 'difficulties' with his Miletos example, chiefly 'the fact that, while the succeeding 350 m. of wall (up to the area of the Sacred Gate) and the whole of the S crosswall traverse ground that is just as much πεδινή as that in which our presumed "maiander-trace" occurs, the type of trace is altered'. As regards Side, he writes that '[a]nother possible example of a trace related to Philo's "maiander" type occurs [...] on either side of the angle where the southern end of the land wall meets the southern sea-wall. It is true that there are no towers in this stretch, whereas Philo's "maiander-trace" presumably was provided with towers. Yet the Side wall certainly does form a pattern that recalls the stretch at Miletos, and might reasonably be described as a "maiander". (McNicoll, *Fortifications* 143 fig.33 is a site-plan.)

A84.3–5 [*86.5–7*] **ἡ δὲ ἐκ τῶν ἡμικυκλίων καὶ πριονωτή, ὅταν ὁ τόπος ᾖ σκολιός, ὃν ἔσω δεῖ περιλαβεῖν** ('the one (formed) out of semicircles and the serrated one (are best) when the terrain which is it necessary to enclose is twisting'). For these two systems see already, respectively, A39–43 [*82.43–83.7*] and A44 [*83.7–14*]. Declaring, now, that they are both intended for terrain which is *skolios* does not of course explain why in any given circumstances the one might be preferred over the other, and in any case the precise sense of *skolios* in such a context is not self-evident; cf. the posterns in A34 [*82.21–22*] (see Comm. there under **αἱ μὲν σκολιαί**), and under the preceding lemma here, **ἡ μέν**.

Winter, *Fortifications* 117, lays out the problem as follows. 'Diels and Schramm [39] translated "gebirgig", but this is not satisfactory. The word usually means "jagged", "crooked", or as applied to a river "winding" or "twisting". Many but by no means all mountainous sites would also be σκολιός. Here, however, the word seems rather to refer to any site where the terrain traversed by the wall winds or twists sharply in and out, whether it be the top of a cliff, the bank of a river or edge of a ravine, or a rocky coastline. Moreover, mountainsides broken by a number of deep ravines, or peninsulas with several deep bays and inlets, clearly are not included in the term σκολιός, though many of them could certainly be described as "gebirgig". Such sites belong rather to the next category, ἡ δὲ διπλῆ, ὅταν κόλπους καὶ ἀναχωρήσεις ἔχῃ, τὸ πόλισμα ὅπου δεῖ κτισθῆναι. Probably we should interpret σκολιός [here: DW] as referring to a series of short, sharp curves or zigzags'. See also Lawrence 80, citing (as does Garlan 367 n.84*d*) Plutarch's characterization of the land round Sellasia, in Laconia, as '*skolia* and full of watercourses and gullies' (Plut. *Philop*. 6.8).

No exact matches for Ph.'s semicircular trace have been identified in the field. The nearest Winter comes is to note in passing 'possible parallels for the idea' in *gates*, at Sillyon (Pamphylia) and elsewhere, which have 'an open-fronted court of semi-circular plan' ('Indented trace' 425 n.65, 426); and see already under A39 **ἐκ τῶν ἡμικυκλίων** for McNicoll on another Pamphylian site, Side. Lawrence 349 comments that in some places 'a few individual curtains retreat inwards with shallow curvature'. The instance he gives, with a photograph (his pl.37), is '(H)arma', ancient Heleon, in SW Boiotia.

On the 'serrated' trace see under A44 **Ταύτῃ**.

A84.5–7 [*86.7–9*] **ἡ δὲ διπλῆ, ὅταν κόλπους καὶ ἀναχωρήσεις ἔχῃ, τὸ πόλισμα ὅπου δεῖ κτισθῆναι** ('the double one, when there are hollows and recessions where it is necessary to establish the settlement'). It is not clear what Ph. saw as the distinction, if any, between a κόλπος (again, but not in a topographical sense, in C52.4 [*94.43*]) and an ἀναχώρησις.

For this system (cf. under the preceding lemma), an obscure and controversial one, see already A45–54 [*83.15–47*], and further in Winter, *Fortifications* 120–121. He characterizes this mode as particularly apt for sloping ground (cf. Garlan 367 n.84*f.*): '[w]hile the attackers were still at a distance from the walls, they would of course be vulnerable to artillery fire from towers and curtains. However, where the ground fell away sharply from the foot of the wall, there would be a strip of "dead ground" which could be covered only by defenders with hand weapons. The design of the "double trace" permitted these archers and spearmen to be posted along the top of the outer wall without in any way hindering the artillery batteries mounted on the main curtain. […] Yet no matter where it was employed the "double trace" would have been very costly and time-consuming [to build]. If we have correctly interpreted its advantages, it was obviously designed for systems in which artillery of one sort or another formed the mainstay of the city's defences'.

Winter further reports that no exact match for what Ph. (inexactly) describes is furnished by the archaeological record, but claims that the 'basic idea' can be seen in two Sicilian instances from, apparently, the first half of the third century: the north gate at Selinous (his figs.95, 177, 178) and the penultimate phase of the Euryalos fort at Syracuse (his fig.173; cf. 'Indented trace' 425 n.62). Inevitably, however, even this much will be moot if the basic understanding of what Ph. means is questioned; cf. under A45 **Παρὰ δὲ ταύτην**.

A84.7–8 [*86.9–10*] **ἡ δὲ λοξὰ τὰ μεσοπύργια ἔχουσα τοῖς τριγώνοις εἴδεσιν** ('the one which has slanting curtains for (salients in) triangular shapes'). For this system see already A55–58 [*83.47–84.5*]. The discussion in Winter, *Fortifications* 121 justifies the gloss I have added to my translation here: 'this phrase must refer to *salients* […] triangular *sites* are surely rather rare, and the long legs of such a triangle would in any case have destroyed the special advantage of the "oblique" trace. Triangular salients required special attention, since only limited fire-power could normally be concentrated in the apex of the triangle'.

More generally Winter comments as follows (*Fortifications* 121–122): 'Philo tells us that the special virtues of the τειχοποιία λοξὰ τὰ μεσοπύργια ἔχουσα lay in its convenience from the structural point of view and in the mutual cover and protection which the towers provided for each other. It seems puzzling at first that this "oblique" trace should have been regarded as easier to construct than the "archaic" trace which is next described. Yet Philo's remark seems clear enough when we consider the possible stretches of "oblique trace" extant at Argos and Miletos. […] The tactical advantages are easily apparent, and would in fact have been most telling in Philo's τριγώνοις εἴδεσιν. […] The Argive example shows what extensive fire could be brought to bear on the area in front of the salient. At the same time the fire from the towers could also be directed backward along the flanks of the salient, in the event of attacks developing in those quarters'.

As indicated, both Winter here (with his fig.99) and Garlan 367 n.84*h* (with his fig.61) find such a shape (and the teichopoiic response to it) in the triangular salient added in the Hellenistic period to the NE sector of the wall round the Aspis at Argos; and Winter (though not Garlan) further adduces the southern crosswall at Miletos (his fig.100; cf. McNicoll, *Fortifications* 13) and, albeit more broadly, Gortys (his fig.102; cf. Adam, *L'architecture* 179). See also already under A55 **Εὐχερεστάτη**.

A84.8–9 [*86.10–11*] **ἡ δ' ἀρχαία τοῖς περιφερέσι χωρίοις** ('the old one for rounded sites'). Following L. Robert (in his review of Maier vol. I: *Gnomon* 42 (1970) 579–603, at 588–589), Garlan 368 n.84*j* notes that in Hellenistic prose the sense of χωρίον is often that of 'forteresse, place forte'. See also P. Debord, 'Le vocabulaire des ouvrages de défense: occurrences littéraires et épigraphiques confrontées aux *realia* archéologiques', *REA* 96 (1994) 53–60. Here though – the only instance in Ph. – the context does not readily lend itself to that sense. And if, instead, the point is (again) a topographical one, περιφερέσι will mean not 'circulaire' (Garlan) but three-dimensionally undulating, in the manner of drumlins.

For this system see already A59–61 [*84.5–18*], and note the general comment in Winter, *Fortifications* 123: '[t]he term can only refer to the system used in practically all extant Greek circuits, that is, the walls run in a more or less continuous line, broken only by the projecting towers. [… Yet t]he "archaic" trace is recommended only for "circular sites" – presumably hill-sites of more or less circular or polygonal outline, such as Pergamon and Demetrias. Such sites would have been quite as well served by this as by any other system, so long as the problem was merely to prevent an enemy advance up the open hillside. Even so we are bound to admit that the simple versions of the "archaic" trace are more frequent in extant circuits than we should expect from a perusal of Philo's work'. Subsequently (*Fortifications* 201–202, with figs.198–204) Winter proffers as 'a fine example of Philo's ἡ ἀρχαία <τειχοποιία> τοῖς περιφερέσι χωρίοις' the small site of Isaura, in the northern foothills of the Taurus mountains in Anatolia; its fortifications – including fourteen (visible) polygonal towers, including heptagons and octagons (Garlan 335) – are thought to date from the second half of the first century.

A85.1–3 [*86.11–13*] **Εὐλαβητέον τ' ἐστὶν ἐν πάσαις ταῖς πυργοποιίαις, ἵνα κατὰ μηθὲν τὸ τεῖχος ἀμφίβολον οἰκοδομῆται** ('Care is to be taken in all fortification-systems that the wall is at no point built attackable from both sides'). For *eulabeia* see also D20.3 [*98.22*]: the commander of the attacking forces is urged to take particular care (μάλιστα εὐλαβοῦ) to send help to wherever it is needed. The present passage's εὐλαβητέον ('one must beware': LSJ s.v.) seems to be an idiom with Platonic origins: *Grg.* 480E and 527B, *Rep.* 4.424C and 10.608A.

What defenders must (or might) do in circumstances where the builders of their wall had failed to follow this prudent recommendation will be suggested in C63 [*95.32–36*], where again ἀμφίβολον describes it. LSJ s.v. ἀμφίβολος II.1 finds the earliest instance of this sense of the adjective – normally applied to troops – in Attic tragedy (Aesch. *Sept.* 298); see also Thuc. 4.32.3 and 4.36.3, Plut. *Cam.* 34.2.

A86 [86.13–18]: funerary towers

A86.1–3 [*86.13–15*] **Δεῖ δὲ καὶ τῶν ἀγαθῶν ἀνδρῶν τοὺς τάφους καὶ πολυάνδρια πύργους κατασκευάζειν** ('It is also necessary to provide the tombs of brave men and multiple burial-places (in the form of) towers'). Ph. does not say whether he recommends promising this in advance (as, for instance, the Rhodians did when faced by Demetrius Poliorcetes: Diod.Sic. 20.84.3, ἔγραψαν δὲ καὶ τῶν τελευτησάντων ἐν τῷ πολέμῳ τὰ μὲν σώματα δημοσίᾳ θάπτεσθαι κτλ) or simply implementing it *post mortem*. In any event, while the notion that actual death in combat is the way to prove one's bravery is commonplace elsewhere (see below), it should be noted that in Ph. 'brave men', ἄνδρες ἀγαθοί, can still be alive: contrast the present passage with C46 [*94.24–26*], on promoting and rewarding mercenaries ὅσοι ἂν ἄνδρες ἀγαθοὶ γίνωνται, and D68 [*101.37–41*] (the commander should praise and honour troops τοὺς μὲν ἀγαθοὺς γινομένους ἄνδρας, but revile and punish τοὺς δὲ κακούς.) See also e.g. Diod.Sic. 20.84.3 (above): 'they voted also to buy from their masters, and to emancipate and enfranchise, those slaves who had proved *andres agathoi* in the conflicts'.

On commemoration of war-dead in the Hellenistic period see generally Chaniotis, *War* 236–240, with evidence to which may now be added V. Contorini, 'Inscriptions de Rhodes pour des citoyens morts au combat, ἄνδρες ἀγαθοὶ γενόμενοι', *BCH* 136–137 (2012–2013) 339–361 (two third-century instances, including the fallen general Astyanax, and one from the first century). Ph.'s particular advice about it here, spelled out in the ἵνα-clause which follows, is that tombs, whether individual/familial or collective (πολυάνδριον is a variant, here and elsewhere, of the more usual πολυανδρεῖον: LSJ s.v. II.2), should not be free-standing mounds or suchlike but integrated into the city's defences. The clear implication is that, besides the fact of contributing to those defences themselves, the commemorative process itself will be enhanced by association with the community's safeguarding in perpetuity; see further under the next lemma.

Garlan 368 n.86*a* cites three episodes from Xenophon's *Hellenica* (3.2.14–15, 6.2.20, 7.1.19) where burial monuments play an impromptu part in military action in Asia Minor in the first half of the fourth century; the first of these includes the phrase ἐρύματα καὶ τύρσεις, but these may or may not have been funerary towers, and even if they were, they are not part of a city's circuit-wall. On burial towers of the Hellenistic period see e.g. E. Will, 'La tour funéraire de la Syrie et les monuments apparentés', *Syria* 26 (1949) 258–312. Though examples of a city doing what Ph. advocates here are hard to identify in the archaeological record of the period (Lawrence 88 notes that '[a] great circular tower on a seaward corner of Attaleia (Antalya) might well have been built specifically for a tomb, but it is likely to be Hadrianic'), there is perhaps, as Garlan comments (first in 'Cités' 20), an epigraphically-attested one from Hellenistic Smyrna or its environs. Once attributed to Athens/Attica (as IG ii^2 11965) but re-attributed to Smyrna by L. Robert ('Hellenica', *RPh* 70 (1944) 5–56, at 44–46 = *Opera Minora Selecta* III (Amsterdam 1969) 1371–1422, at 1410–1412), this grave monument was put up by 'the people' (ὁ δῆμος) in honour of one Lenaios Artemidorou; in an elegaic couplet below the garlanded name he declares that he will strive to watch over his tower *post mortem* just as he did before as a warrior (καὶ τὸ πρὶν ἐν πολέμοις τηρῶν πύργον, παροδῖτα, | καὶ νῦν τηρήσω, ὡς δύναμαι, νέκυς ὤν). See now I.Smyrna 516, with Petzl's commentary there; and further in J. Ma, 'Une culture militaire en Asie Mineure hellénistique?', in J.-C. Couvenhes and H.-L. Fernoux (eds.), *Les cités grecques et la guerre en Asie Mineure à l'époque hellénistique* (Paris 2004) 199–220.

A86.4–6 [*86.16–18*] **καὶ οἱ μὲν δι᾽ ἀρετὴν <ἀριστεύσαντες>, οἱ δ᾽ ὑπὲρ τῆς πατρίδος τελευτήσαντες ἐν αὐτῇ τῇ πατρίδι καλῶς ὦσι τεθαμμένοι** ('and also that those <who achieved distinction> in valour and those who died for their fatherland may end honourably buried in the fatherland itself'). Brinkmann ap. Schoene first posited a lacuna after δι᾽ ἀρετήν, and <ἀριστεύσαντες> to fill it (balancing τελευτήσαντες) is accepted, from Diels-Schramm 39, by Garlan 300 and (apparently) Lawrence 89.

The phraseology created thereby would be puzzling if both of the categories of men differentiated (οἱ μέν … οἱ δ᾽ …) were to be buried in the towers mentioned; one would then need to ask, in what does the differentiation consist? Differentiation could be created by assuming that the phrase δι᾽ ἀρετὴν <ἀριστεύσαντες> does not apply to military prowess but to more general excellence in other spheres; however, in this context it surely does have a military application. Accordingly, the differentiation must be one which takes up the difference between *taphoi* and *polyandria* earlier in the sentence (see under the preceding lemma), and is implied in the parenthesis added by Lawrence 89 to his translation of τῶν ἀγαθῶν ἀνδρῶν τοὺς τάφους: '(individual) tombs of honoured men'. War-dead buried in their own or their family's 'tomb' are likely to have had their ἀρετή (and other associated virtues) lauded *ad hominem*; soldiers placed in 'multiple burial-places' will have had to settle for a generic recognition of their service.

This double mention of the *patris* makes it clear that Ph. has citizen dead in mind. (Note in general IACP 49–53, 'The concept of patris', including its being 'the proper place to be buried.) For dead mercenaries see C47 [*94.26–29*].

A87 [86.18–21]: conclusion/drawings

A87.1–3 [*86.18–20*] **Τούτων δὲ ὧν δεδηλώκαμεν πασῶν τῶν πυργοποιῶν ἐν αὐτῷ σοι τῷ βιβλίῳ τὰ σχήματα γέγραπται** ('The shapes of all these fortification-systems that we have presented have been drawn for you in the book itself'). In place of the transmitted αὐτῷ... τῷ βιβλίῳ Haase conjectured ἐσχάτῳ ('final'), but no-one has taken this up, and in fact the change raises more questions than it answers.

For drawing σχήματα see *Bel.* 62.24–25, which uses a special verb for it: προφανῆ δέ σοι καὶ τὴν ὄψιν αὐτοῦ θήσομεν ἐπ᾽ ἐσχάτῳ σχηματογραφήσαντες (also in Athen.Mech. 39.7–8, ἐσχηματογραφημένα πάντα ἔσται τὰ μηχανήματα). The σχήματα referred to in the present passage are of course long gone, a casualty of the epitomization process which reduced Ph. to the form – unsatisfactory in any case – in which we have him.

The scribes responsible for the mss of Ph. made no attempt to fill this gap. Those who worked on the *Par.Pol.* had no occasion to proffer their versions of Ph.'s

πυργοποιαί (which that work does not take up), but for their illustrations of four other items presented via Ph.'s part D (D36–37 [*99.29–37*], D39 [*99.41–44*], D44 [*100.6–11*] and D73 [*102.12–19*]) see Garlan 398–401 figs. 68–71; cf. Sullivan, *Siegecraft* plates 1–3.

This is the first of seven instances of σοί, and the one most directly personal to the recipient Ariston himself. (The others occur at B19.1 [*87.32*], D10.2 [*97.20*], D10.12 [*97.30*], D25.1 [*98.42*], D66.1 [*101.31*] and D70.11 [*102.1*].) The corresponding phrase in *Bel.*49.1–2 is τὸ μὲν ἀνώτερον ἀποσταλὲν πρὸς σὲ βιβλίον; cf. καθότι τὴν ἐξ ἀρχῆς διάταξιν ἐποιησάμεθα πρὸς σέ in 49.4–5.

PART B: PROVISIONING AND PREPARATION

When the men of Akragas were besieging the Sikanoi, Phalaris, unable to capture them because they had prepared plenty of grain, ended the war; but he also deposited with them the grain from his army, having secured an agreement that he would take away the grain about to be harvested. The Sikanoi gladly received it. Phalaris then persuaded their grain-guards, by bribing them with silver, to break apart the roofs of the storehouses, so that the grain would get wet and would rot – while he received the newly-harvested grain in accordance with the agreement. So after having no choice but to give the produce of their land to Phalaris, and discovering that the grain in the city was ruined, they surrendered to him because of the grain-shortage.

(Polyaen. 5.1.3; cf. Front. *Strat.* 3.4.6)

The Athenians sailed across from Abydos into the Chersonese and began a siege of Sestos. Since Sestos had the strongest fortifications in the area, when people from the outlying towns heard that the Greeks had entered the Hellespont they congregated there. […] Sestos was in the possession of local Aiolians, but living with them were Persians and a great mass of their other allies. Ruler of this province was Xerxes' governor Artyaktes, a Persian clever and reckless […] Now he was being besieged by the Athenians, at a time when he was not prepared for a siege nor expecting the Greeks; their attack caught him somehow off guard. Autumn came with the siege still in progress […] and those in the stronghold had reached a state so totally dire that they were boiling and eating their bedstraps. When not even these were left, the Persians, Artyaktes […] included, left the town during the night by climbing down that part of the wall most remote from the enemy. When day broke, the Chersonesites signalled to the Athenians from the towers, telling them what had happened, and opened the gates; most of the Athenians went in pursuit of the fugitives, while the rest occupied the city.

(Hdt. 9.114–118, abridged)

As is clear from D72 [*102.9–12*], expanded in D84–85 [*103.4–11*], Ph. was in no doubt of the effectiveness of blockade and starvation as a way of bringing a city to its knees (see already General Introduction D.ix, under γ); and the historiographical record is replete with episodes which show that belief to be very well-founded, even when the safety of the place concerned was in hands more competent and less self-seeking than those of Artyaktes (as e. g. in Mantineia in 385, facing King Agesipolis I of Sparta: Xen. *Hell.* 5.2.4). In Ph., nevertheless, all strategies have their opposites, and in this instance it is part B which lays it out. Here is a set of policies, actions and attitudes which, if they necessarily fell short of a copper-bottomed guarantee of survival, at the very least gave that outcome a fighting chance.

Assuming (as a point of note in itself) that no significant amounts of food would be coming into the city while the blockade is in progress, Ph. sees the keys to survival in two areas. One is advance planning, so as to stockpile and store a significant amount of grain, with other foodstuffs in nutritional support. The other is using food intelligently and sparingly, to make it last. (On the basis of anecdotes in Frontinus (*Strat.* 3.15.1–6) and Polyaenus (2.18, 6.47, 7.36) we might also have expected advice on how to give the besiegers the false impression that food stocks are abundant when they are not, but here the topic is not broached.)

How original (or "original") was this? On one level the answer is likely to be, hardly at all. So many individual aspects of what he recommends are things that real-life communities in these straits demonstrably did, or can be imagined as do-

ing, without needing Ph. to tell them to. A more precise question, accordingly, is where Ph. stands in this area *qua* intellectual topic, systematically addressed.

We do know – see already Introduction A.iii – that Ph. made use of his most significant predecessor, Aeneas Tacticus, and that Aeneas wrote a *Procurement* (*Poristikê biblos*) and a *Preparations* (*Paraskeuastikê biblos*). Since both works are lost, views about what they covered are bound to be speculative. This is at any rate true of the *Poristikê*, two mooted parallels for which differ significantly one from another (Xenophon's *Poroi* and book 2 of the Aristotelian *Oeconomica*), and the only element of that treatise's contents which can be established with any certainty is the one mentioned by Aeneas himself (14.2): 'how this [*sc.* providing the basic amenities of life for the needy] could be done fairly and without pain to the rich, and where the money might come from'. More of what Aeneas's *Paraskeuastikê* embraced, though, is discernible from its author's four allusions to it: 'the way to do this [*sc.* gathering people inside the city], and to raise fire-signals' (7.4); 'the number and nature of ruses to be employed against enemies landing on sandy or rocky shores; what kinds of barriers against them should be in readiness at the harbours of the city and its territory, to present them from sailing in or else, if they have done so already, to bar their exit; how to render useless or, failing that, to conceal anything deliberately left behind in the countryside which could be helpful to the enemy in, for example, making walls or encampments or in other operations; how one must <dispose of> the food and drink and the standing crops and everything else in the countryside, and make the still waters undrinkable, and spoil the ground best suited to use by cavalry' (8.2–5); 'the provision of equipment; the advance preparations <necessary> in friendly territory; the ways in which one should conceal or render useless to the enemy the resources of the countryside' (21.1); and 'grainless rations, shortages during a siege, and the means of making water fit to drink' (40.8).

Much of this maps instantly and suggestively onto the contents of Ph.'s part B, even as transmitted in its epitomized form: above all, 'grainless rations' (τροφὴ ἄσιτος), water purification and its obverse, equipment-provision, and signalling. Some of what is summarized at Aeneas's 8.2–5 and 21.1, on the other hand, does not obviously prefigure anything in part B; instead, such links with Ph. as are evident, on the topic of military preparations to be made against an approaching enemy, are with part C (q. v. below).

From a substantive point of view the main challenges for a commentator on part B are twofold. One is to elucidate, without significant comparanda to hand, Ph.'s recommendations for the construction of granaries etc. in B6–29 [*86.39–88.20*]. The other, applicable throughout, is to identify the natural products and foodstuffs – some of which feature as ingredients in recipes –that he mentions. Many of these are familiar and unproblematic; certain ones, in amongst the standard fare, are not.* Here again, our inability to identify named sources is a major

* In identifying (where that is possible) and commenting on these items I owe a large debt to Andrew Dalby's *Food in the Ancient World from A to Z* (London & New York 2003). Its short entries, valuable and insightful in themselves, are made the more so by the dossiers of primary source-references appended. Ph., nonetheless, is systemically underused: the solitary reference to him is the generic one (to '88.25–89.46 Thévenot' [= B31–48]) given at p.139, s. v. 'Famine'.

handicap, but in generic terms at least once can point to Heinrich von Staden's demonstration that the vocabulary of Ph.'s recommendations on nutrition in the besieged city is heavily indebted, probably via his contemporary Andreas of Karystos (court doctor to Ptolemy IV Philopator) and Andreas's own teacher Herophilus, to Hippocratic treatises on the subject: see General Introduction, section B, end. Table II in von Staden lists 45 food items – and also three medical items, relevant to Ph.'s C72 [*96.15–24*] – that are shared in common between Ph., the Hippocratic corpus, and Hellenistic medical works by Herophilus and others. Mundane in themselves in many instances, they nonetheless build cumulatively into a cogent indicator of influence. (See also, more generally, B43 under **κάθαρσιν**.) Beyond that, it seems clear that tracking down the origins of some of these commodities involves looking beyond the core Greek Mediterranean to the products (and dietary habits) of both "Scythia" and the Near East.

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B1–5 [86.21–39]: storing non-perishable foodstuffs

B1.1–2 [*86.21–22*] **δημοσίᾳ καὶ κατὰ τὰς ἰδίας οἰκίας** ('in public keeping and in private houses'). Food-storage in individual houses is also advocated at B31.1–3 [*88.25–27*], and gardens in private houses are mentioned at B48.1–2 [*89.38–39*].

Ph's phrase as a whole is an elaboration – reasonable enough, in the circumstances – of the commonplace dichotomy δημοσίᾳ καὶ ἰδίᾳ. Compare generally Diod.Sic. 13.58.3 on the reception of the refugee population of Selinous in Akragas, after the Carthaginian capture and sack of their city in 409: οἱ … Ἀκραγαντῖνοι σιτομετρήσαντες αὐτοῖς δημοσίᾳ διέδωκαν κατὰ τὰς οἰκίας.

For δημοσίᾳ in Ph. cf. already A76.1–2 [*85.22–23*] (παρά τε τῶν πολιτῶν καὶ δημοσίᾳ), and again C26 [*93.1–3*] (Δημοσίᾳ τε εἰς ἕκαστον ἄμφοδον δοτέον ἐστὶν λιθοβόλον δέκα μνῶν καὶ καταπάλτας δύο τρισπαθάμους), C27 [*93.3–4*] (καὶ τοῖς μὴ κεκτημένοις ὅπλα μηδὲ δυναμένοις κατασκευάσασθαι δημοσίᾳ δοτέον ἐστίν) and C47.1–2 [*94.26–27*] (καὶ ἐάν τινες τελευτήσωσιν, θάπτειν ὡς λαμπρότατα δημοσίᾳ). In these other instances the idea conveyed is public *expense*. Here in B1 too that is implicit, but as a by-product of the fact – inherent in the contrast with private houses – that the place(s) as well as the expense of storage should be communal. 'Sans doute dans des bâtiments publics', declares Garlan 368 n.1*b*, citing (from A. Di Vita, 'Breve rassegna degli scavi archeologici condotti in provincia di Ragusa nel quadriennio 1955–1959', *BdA* 44 (1959) 347–363, at 349–350) the instance of Kamarina; there grain deposits in the remains of one of the akropolis towers indicates that it functioned as a granary during the Carthaginian siege of 405.

See further under the next lemma.

B1.2–3 [*86.22–23*] **ἀποκεῖσθαι πολλὰ τῶν ἀσήπτων** ('to store away many of the things that are impervious to rot'). The topic of food begins, as transmitted, with good practice in respect of 'other' such things, ἄλλα τῶν ἀσήπτων, which ought to mean that some have been mentioned already. (Any possibility that ἄλλα … οἷον *x*

is an idiom equivalent to ἄλλα τε καὶ *x* can surely be discounted, even if one were to accept Graux's ἄλλα <τε> τῶν.) Perhaps opening material is missing; cf. 'Anderes enthielt der dem Exzerpt vorhergehende Abschnitt' (Diels-Schramm 40, whose supplement ἀποκεῖσθαι <καὶ> ἄλλα is accepted by Garlan 301). Alternatively one might envisage part B starting at B6 [*86.39–45*], with the present B1–5 [*86.21–39*] placed after B30 [*88.20–25*] (where the section on grain ends). Simplest, however, is to emend ἄλλα to πολλά, with Schoene (and ignore the Diels-Schramm <καί>).

The adjective ἄσηπτος has already featured in A76.4 [*85.25*], on seaweed for stuffing booby-trap pots, and it will be prominent in the topic addressed here: again B3.3–4 [*86.34–35*], B9.5 [*87.1*], B26.1–2 [*88.3–4*], B27.1–2 [*88.8–9*], and cf. also <οὐ> σήπεται in B10.6 [*87.7*]. (Compare generally the image used in Plut. *Mor.* 1095A, on collecting pleasures: ὥσπερ εἰς πολιορκίαν ἄσηπτα σιτία καὶ ἄφθαρτα παρατιθεμένους. Ph. will use ἄφθαρτος as a variant of ἄσηπτος at B28.2 [*88.15*].) We are in no position to say whether the illustrative (οἷον) list of foodstuffs, now beginning, to which it applies had a precedent in Aeneas Tacticus (or indeed anywhere else).

A Byzantine-era list of foods to be monitored and stored concentrates on grain and analogous staples (*De obsidione toleranda* 5: χρὴ τὸν σῖτον καὶ τὴν κριθὴν καὶ πᾶν εἶδος ὀσπρίου τὸν ἐν ταῖς ἀποθήκαις ὁμοῦ τοῖς ἐμπόροις καὶ τοῖς πλουσίοις ἀπομετρεῖν καὶ ὡρίοις [= *horreis*] ἀποτιθέναι κτλ). See also under B49 **Δεῖ δὲ παρασκευάζεσθαι**.

B1.3 [*86.23*] **οἷον** ('such as'). The summary list of illustrative ἄσηπτα hereby introduced begins coherently enough, with ten items in the accusative case (dependent upon ἀποκεῖσθαι); B2 [*86.27–32*] then presents expanded remarks on preserved meats, after which B3 [*86.32–35*] resumes the list, with an eleventh item, before B4–5 [*86.35–39*] has more to say about meat. Schoene's suggestion that B3 could advantageously be transposed earlier, to follow either κέγχρον or ἄρτους in B1.7 [*86.27*], seems to me persuasive but has not been taken up by his successors.

B1.3 [*86.23*] **κάχρυ** ('(?)parched barley'). The first paradigmatic item in Ph.'s list presents an interpretative crux. See generally LSJ s. v. (with Supplement): '**κάχρυς**, υος (acc. κάχρυδα Dieuch. ap. Orib. 4.7.7, gen υδος ib.20; pl.acc. κάχρυς Ar.*Nu.*1358), ἡ, *parched barley*, Cra in.274, Hp.*Mul.*1.97, Ar.*Nu.*1358, *V.*1306, Gal.11.404. **2**. *winter-bud*, Thphr.*HP*3.5.5, 5.1.4: acc pl. τὰς κάχρυς ib.3.14.1. **II**. neut. **κάχρυ**, τό, fruit of λιβανωτίς, ib.9.11.10, Ph.*Bel.*[*sic*] 86.23, Dsc.3.74 (v.l. κάγχρυς); also, *the whole plant*, Ps.Dsc.l.c.; κάχρυος ῥίζα Hp.*Nat.Mul.*32, Philum. *Ven.*6.1'.

As we see there, LSJ classifies the present passage under the λιβανωτίς head. Garlan 301 evidently follows this ('libanotide'), with a brief note (368 n.1*c*) as follows: 'genre d'Ombellifères [= umbelliferae, a. k. a. apiaceae], tribu des Sésélinées, sous-tribu des Cachrydées, dont plusieurs espèces produisent des grains vêtus comestibles'. (LSJ s. v. λιβανωτίς is less helpful.) If Ph. really did write and, more important, did mean to write neuter κάχρυ, all this might be correct. However Diels-Schramm 40 translate κάχρυ as *Gerste* (barley); likewise von Staden, 'Andréas' 167; and cf. also B. Campbell, *Military Writers* 160, 'pearl barley', though strictly

speaking, as I understand it, that term is anachronistic, stemming from modern processing methods. (Dalby's translation of *Geop.* 7.15.19 and several other passages does include 'pearl barley', but for ἄλφιτα – what he elsewhere calls, more appropriately in my opinion, barley *meal*.) In ancient terms the appropriate designation for κάχρυ(ς) would be LSJ's 'parched barley', i. e. barleycorns dried or roasted in order to free the grains from their husks; cf. Dalby, *Food* 46. That definition is underpinned by e. g. the well-known lines of Cratinus (fr.300 K.-A.) about parching kachrys on the kyrbeis of Drakon and Solon (πρὸς τοῦ Σόλωνος καὶ Δράκοντος οἷσι νῦν | φρύγουσιν ἤδη τὰς κάχρυς τοῖς κύρβεσιν), quoted in Plut. *Sol.* 25.2, and by Strab. 15.3.10 on the climate in Persis, hot enough to heat cold bathwater and to parch barleycorns in the sun just like kachrys in the ovens (τὰς δὲ κριθὰς διασπαρείσας εἰς τὸν ἥλιον ἄλλεσθαι καθάπερ ἐν τοῖς ἰπνοῖς τὰς κάχρυς).

Grammatical forms aside, I have followed those who believe that parched barley is what Ph. had in mind here. (He never, incidentally, mentions ἄλφιτα (above) – though Diels sought to restore it in B42.3 [*89.17*] – but see B6.1 [*86.39*] for κριθαί and B27.2 [*88.9*] for κριθή. On κρίθινον in B54.2 [*90.25*] see the Comm. thereto.)

Whether there is more evidence for this sense of the word as a foodstuff (as opposed to a medicine or medical ingredient) might be considered a moot point, given the difficulty of determining – without begging the very question at issue – whether the καχρυδίας ἄρτος attested in Pollux (1.248, 6.33, 6.72) and elsewhere is made from κάχρυς or κάχρυ. The answer is usually likely to be the former, but the latter cannot be ruled out in every instance. John Hill's 1751 *The History of Plants* (available via googlebooks) registers *cachrys foliis ovato-oblongis asperis* and declares that '[t]he Russians and Tartars, in scarcity of corn, make bread of its roots'. It would be instructive to find a similar remark in an ancient writer; nevertheless, even lacking one, Ph.'s list here of ἄσηπτα which it is worth storing away is more likely, it seems to me, to have begun with a conventional food item than one edible only *in extremis*.

B1.3–4 [*86.23–24*] **τὸν ἐν τοῖς δράγμασι πυρόν** ('wheat (still) in its sheaves'). The reason for this stipulation is to prolong its life, as explained in B25 [*87.51–88.3*], q. v.

For δράγματα (a word known since Homer: *Iliad* 11.68, 18.552) in a siege context cf. Xen. *Hell.* 7.2.8: in the unsuccessful attack (by the Argives, Arkadians and Eleans, working with democratic exiles) on Phleious in the early 360s, the defenders of the akropolis set fire to their opponents' siege-towers 'by bringing forward some of the sheaves which happened to have been reaped from the akropolis itself' (προσφοροῦντες τῶν δραγμάτων ἃ ἔτυχεν ἐξ αὐτῆς τῆς ἀκροπόλεως τεθερισμένα). This, then, is an instance of Ph.'s grain kept ἐν τοῖς δράγμασι, here actually grown where it was stored. (Growing grain inside a town, indeed inside its separately-walled akropolis, cannot have been common practice, but see B48 under **Συμφέρει** for *gardens* on akropoleis – in Sikyon (Diod.Sic. 20.102.4) as well as in Ph.'s recommendations – and Megalopolis's intra-mural planting of grain in extreme circumstances: Plut. *Philop.* 13.2.)

B1.4 [*86.24*] **ἐρεβίνθους** ('chickpeas'). The familiar (then as now) *cicer arietinum*. See generally Dalby, *Food* 84; Hipp. *de diaeta i–iv* 2.45.5–7; Diosc. *de mat.med.*

2.104.1–2; and the dossier of quotations and information in Athen. *Deipn.* 2.54E-55B, which begins (chronologically speaking) with the celebrated Homeric simile of 'black beans or chickpeas' hopping on the threshing-floor (*Iliad* 13.589).

The copious evidence relating to the use of chickpeas as a side-dish or sweetmeat, a *tragêma*, is of course largely irrelevant to the context here, where the *erebinthoi* are evidently to be dried and stored away as an emergency staple. Theophrastus names chickpeas, along with lupins, bitter-vetch and millet (on all of which see lemmata below), as suitable for long keeping (*HP* 8.11.6; slightly different list, including sesame, at 4.15.3).

B1.4 [*86.24*] **θέρμους** ('lupins'). The identification is clear (see LSJ s. v.); certainly not beans ('Bohnen': Diels-Schramm 40). Greek θέρμος is held to be the equivalent of *lupinus albus*.

Though lupins – lupines in U. S. spelling – are usually encountered in the modern Western world as flowering garden plants, as legumes their bitter seeds are a long-established (if low-grade) food which can safely be eaten after being boiled. See generally Dalby, *Food* 201; Hipp. *de diaeta i–iv* 2.45.14–16; Diosc. *de mat. med.* 2.109.1–2; and the dossier of quotations and information in Athen. *Deipn.* 2.55C-F. One could add (e. g.) the passing allusion in the third-century Cynic philosopher Teles of (?)Megara to a specialized lupin market, or market-area, in Athens in the time of Diogenes: κάνταῦθα ἄγει αὐτὸν καὶ εἰς τοὺς θέρμους – where a choinix (B35 under **χοινίκα**) of lupins cost next to nothing (περὶ αὐταρκείας 16.6–7).

According to Florentinus (third century CE) as cited in *Geop.* 2.39.5, bakers can make 'satisfactory loaves', ἄρτοι ἐπιτήδειοι, by adding lupin(-flour) to that of barley or wheat.

B1.5 [*86.25*] **ἱππάκην** ('*hippake*'). An obscure (and translation-defying) item, but clarified, somewhat, by remarks in Theophrastus and Pliny. Glossing a stray phrase in Aeschylus (fr. 198 Radt: ἀλλ' ἱππάκης βρωτῆρες εὔνομοι Σκύθαι) quoted in Strab. 7.3.7, lexicographers define ἱππάκη as a Scythian mares'-milk cheese: so e. g. Hesychius ι 778, citing Theopompus (FGrH 115 F45) to the effect that the milk is consumed in solid form as well as drunk. See also e. g. Hipp. *de aëre aquis et locis* 18.18–20; Diosc. *de mat.med.* 2.71.1.10–12, 2.75.1.6–7. Accordingly Diels-Schramm 40, without discussion, take this to be what Ph. is talking about here ('Stutenkäse'). However, before mentioning this cheese in *HN* 28.131 & 204, Pliny has already (*HN* 25.83) stated that ἱππάκη is also the name of a Scythian *plant* – one of two which, he claims, can stave off hunger and thirst (Thphr. *HP* 9.13.2 appears to say thirst only) for up to twelve days. The other he calls *scythice*, generally identified with liquorice (on which see Dalby, *Food* 197).

No identification of botanical ἱππάκη seems to me possible, but at least this information, if accepted, can explain why Ph. wants the substance to be on hand – as either dried leaves or seeds, presumably – in his besieged city. (The need to suppress appetite and ward off hunger will return as a central topic in B31–47 [*88.25–89.38*].)

B1.5 [*86.25*] **ὀρόβους** ('bitter-vetches'). Another word that translators and commentators have sometimes struggled with, though this time within narrower bounds.

Not lentils (as Garlan and B. Campbell); rather, it would seem, one member – for another see *arakoi*, below – of the vetch (*Vicia*) family, on which see generally Dalby, *Food* 342–343. Diels-Schramm 40 translate 'Pahlerbse', again without discussion, and it is true that '[t]he various wild species of *Lathyrus* and *Vicia* are very difficult to identify in Greek and Latin texts' (Dalby, *Food* 167); nevertheless this item in Ph.'s list is more probably the bitter-vetch, *Vicia ervilia*, than the grass-pea. (Note however the possibility that in Ptolemaic Egypt it was the Greek equivalent name of a fodder crop, perhaps clover or grass: so A. Monson, *Agriculture and Taxation in early Ptolemaic Egypt: demotic land surveys and accounts* (Bonn 2012) 31, 35.) Given that Ph. mentions the item here under the general head of ἄσηπτα, he again must have in mind either dried leaves or, more probably, seeds.

Though medical writers valued the orobos (see e. g. Diosc. *de mat. med.* 2.108.1–2), one unpleasant characteristic shared in common by grass-peas and bitter-vetches is their potential toxicity, the former giving its name to an actual disease (lathyrism) and the latter illustrated by the Hippocratic anecdote (*Epidemics* 2.4.3 = 6.4.11) about the food crisis at Ainos, Thrace, in the late fifth century. Later – speaking to a jurycourt in 355 – Demosthenes reminds his fellow-citizens how Athens' plight in (probably) the second half of the 370s had been such as to see *oroboi* on sale (Demosth. 22.15); cf. Garnsey, *Food* 38. While this and other evidence of a similar kind shows that under normal circumstances they were food for the poor and for animals (so e. g. Athen. *Deipn.* 9.406C; Gal. *de alim.fac.* 6.546.12–547.9), it is abnormal, or at least unwelcome, circumstances that Ph. is catering for.

For *orobos*-meal as an ingredient in a sustaining, posset-like drink see B42.4–7 [*89.18–21*].

B1.5 [*86.25*] **σήσαμον** ('sesame'). Again, as a recipe-ingredient, at B32.5–6 [*88.34–35*], B35.1 & 4 [*88.43 & 46*], and B38.2 [*89.3*]. Sesame-seeds were of course, when crushed or pounded, a source of edible oil (see e. g. Thompson, *Memphis* 43, 222, 237), but here, without doubt, they are to be stored as seed; note in any case the dry measure specified at B35.1.

For the pairing of sesame and (the next item here) poppy seeds cf. e. g. Aristoph. *Av.* 159–160 (with N. Dunbar's note) and Suda σ 339, but for a different reason there: their symbolic significance at weddings.

See generally Dalby, *Food* 297–298.

B1.5–6 [*86.25–26*] **μήκωνας πρὸς τὰς τῶν φαρμάκων συνθέσεις** ('poppies for the concocting of potions'). It is unclear in the Greek whether the phrase πρὸς τὰς τῶν φαρμάκων συνθέσεις applies purely to the noun that immediately precedes it, μήκωνας, or should be taken also with earlier items in the list – and if so, which. Though I join Garlan 301 (and B. Campbell, *Military Writers* 160) in assuming the former, Diels-Schramm 40 might be right not to restrict it in that way.

Here again, in any event, poppy-seeds feature in one of the recipes Ph. goes on to give: B32.6 [*88.35*]. (I have used, here as elsewhere, the term 'recipe', but Ph. himself has no word which equates exactly with that. Rather, as here, *pharmakon* is his vocabulary of choice. In my view it should usually be understood in a broad sense encompassing any multi-ingredient preparation which has particular effects,

whether beneficial or harmful. Compare B31–40 *passim* [*88.25–89.10*], B53.1–2 [*90.14–15*], C72.3 [*96.17*], and D91 [*103.30–32*]. In the present passage τὰς τῶν φαρμάκων συνθέσεις is given too restricted a sense by previous translators: 'Arzneibereitung' (Diels-Schramm), 'la composition des médicaments' (Garlan), 'the preparation of medicines' (B. Campbell).)

On poppies – first in a simile at Homer, *Iliad* 8.306–308 – see generally e.g. Hipp. *de diaeta i–iv* 2.45.17–26; Diosc. *de mat.med.* 4.64.1; and Dalby, *Food* 268.

B1.6–7 [*86.26–27*] **ἔτι δὲ κέγχρον** ('and millet besides'). Specifically, common a.k.a. broomcorn or proso millet (*Panicum miliaceum*). See generally e.g. Hipp. *de diaeta i–iv* 2.45.7–10; Diosc. *de mat.med.* 2.97–98; Sallares, *Ecology* 363 and index s.v.; T.F.R.G. Braun, 'Ancient Mediterranean Food', in G.A. Spiller (ed.), *The Mediterranean Diets in Health and Disease* (New York 1991) 10–55, at 38; Dalby, *Food* 218–219.

Its grains, small (see LSJ s.v. II for transferred applications) and quick-ripening, were made into a kind of porridge. Although, in Braun's words, the several varieties of millet were 'the food of backward peoples on the fringes of the Graeco-Roman world' – in Thrace especially: Xen. *Anab.* 7.5.12, Demosth. 8.45 = [Demosth.] 10.16, etc. – and 'for the Greeks and Romans […] a secondary crop', the merits of *kenchros* in particular were recognized by Strabo, amongst others (writing of the Po Valley): 'the greatest preventative of famine, since it withstands all unfavourable weathers and can never fail, even if there is a scarcity of other cereals' (Strab. 5.1.12).

B1.7 [*86.27*] **καὶ φοινικικοὺς ἄρτους** ('plus date loaves'). Schone printed his own emendation of the transmitted φοινικικούς to φοινικίνους, but his successors keep the paradosis.

On dates see generally Dalby, *Food* 113–114, and e.g. the dossier of quotations and information in Athen. *Deipn.* 14.651B-652B. While Ph.'s 'date loaves' are not otherwise attested by the use of this or any similar phrase, and literary sources are silent on the topic of dates in bread-making, Garlan 369 n.1*g* draws attention to the mention of *artophoenix* in a papyrus of the third century CE (PLond 2.90.37); also to the fact that dates (together with grain, wine, oil, and pulses) were one of the foods stockpiled, against siege, by Herod at Masada (Joseph. *BJ* 7.296). I suspect that the second of these comparanda may be more relevant than the first, i.e. that Ph.'s 'loaves' might not be the products of baking – which would not seem to qualify as ἄσηπτα – but dates pressed into "loaf" form.

As noted in the General Introduction (n.36 there), this passage is the first of several in which Ph. assumes that dates and date-palms will be available in his city; see also B48.4–6 [*89.41–43*] with Comm., B52.7 [*90.14*] (planks), C3.2–3 [*91.4–5*], D10.6 [*97.24*], and D17.5 [*98.8*]. Garlan 373 n.48*b* (*à propos* B48) mentions the idea that this assumption is significant in locating the cities for which Ph. is catering well to the east of Balkan Greece, 'car, selon Pausanias, IX, 19, 5, les dattes n'y mûrissaient pas'. Likewise, without documentation, Lawrence 70 ('[d]ates scarcely ever ripen outside a sharply defined climatic belt, and since the trees have no other economic value they would not have been grown elsewhere except as curiosities. The habitat does not extend as far north as Asia Minor but includes parts of Syria, Phoenicia, and Palestine – in fact the border-land for which the Ptolemies and Seleucids contended over more than a century of alternate open war and uneasy peace') and Dalby, *Food* 113 ('The tree would grow in Greece, and elsewhere north of its usual range – its silhouette was evidently familiar when the poet of the *Odyssey* compared Nausicaa to a young date palm [6.163] – but it would not fruit there'). The case is worth making, but it is expressed too categorically. Paus. 9.19.8 (*sic*) does in fact attest to the existence of date-palms in Ionia, and also in Aulis (where the dates, he says, are riper than the Ionian but less ripe than the Palestinian); see also e.g. Strab. 14.1.35 (Chios), and J.G. Frazer's notes on Paus. loc.cit. (palm-trees on the coinage of six other Aegean islands; on this cf. B.V. Head, *Historia Numorum* (Oxford 1911, reprinted Amsterdam 1991) 468, 476, 485, 486) and 8.48.2 (palm-crowns at games). The poor ripening qualities of dates in Greece is in fact a point made first by Theophrastus (*HP* 2.2.8, 3.3.5), and others say the same of Italy (Varro) and Spain (Pliny); even so, the tree itself – and any use(s) its trunks or leaves might be put to, if not forbidden by cult or sentiment – seems to have been familiar enough. On the general issue I agree with von Staden, 'Andréas' 169 n.72: '[i]l serait […] imprudent de tirer des conclusions biographiques sur Philon à partir du fait qu'il mentionne des dattes et du pain de dattes dans son traité'.

B2.1–2 [*86.27–28*] **καὶ παρὰ τοῖς εὐπόροις τῶν πολιτῶν κρέα** ('and among those citizens who are affluent (there should be) meats'). This is Ph.'s sole explicit mention of the richer members of the community (the opposite of the ones mentioned in C27 [*93.3–4*] who, too poor to arm themselves, should be armed by the city), though they appear again, in effect, in D70 [*101.42–102.2*], as the contributors – whom rampaging troops must not be allowed to alienate – of liturgies and eisphorai; see the Comm. there.

The present passage, too, is interpreted by Garlan 369 n.2*a* in liturgical terms, and that is probably correct; the rich will hardly have needed to be advised to keep meats for their own consumption alone. (And note the role of an enforcing decree in the related B5 [*86.37–39*].) With "welfare" thinking of this kind, if so, compare Strab. 14.2.5 (cf. Austin[2] no.110) on Rhodes in his day: 'the people are supplied with food and the affluent support the needy, by a certain ancestral custom; and there are certain liturgies for furnishing provisions, so that at the same time the working man has his sustenance and the city does not run short of what is useful, especially for naval expeditions' (Σιταρχεῖται δὴ ὁ δῆμος καὶ οἱ εὔποροι τοὺς ἐνδεεῖς ὑπολαμβάνουσιν ἔθει τινὶ πατρίῳ, λειτουργίαι τέ τινές εἰσιν ὀψωνιζόμεναι, ὥσθ' ἅμα τόν τε πένητα ἔχειν τὴν διατροφὴν καὶ τὴν πόλιν τῶν χρειῶν μὴ καθυστερεῖν, καὶ μάλιστα πρὸς τὰς ναυστολίας).

B2.2–3 [*86.28–29*] **κρεμαστὰ <ἢ> συγκείμενα ἐν οἰνηρᾷ τρυγίᾳ, ἄλλα δὲ ἡλισμένα** ('hung (to dry) <or> laid down in wine-lees, and others salted'). Schoene supplied <καί> as the (necessary) textual supplement here, but <ἤ> (Diels) is better and has rightly become standard. Three modes of meat preservation are being summarily described.

or else be restricted to the advice about slow drying. Compare in any event B25 [*87.51–88.3*] on keeping grain ἀπαθέστερος. In *Geop.* 19.9.1 Didymus (date indeterminable) asserts that 'fresh meats keep longest when they have been cleaned and dried and put in places shady and damp', σκιεροῖς καὶ νοτεροῖς.)

For dried deer (ἐλάφου) livers see B26.5–6 [*88.7–8*].

B5.1–3 [*86.37–39*] **Συνάγειν δὲ ταῦτα δεῖ παρὰ τῶν μαγείρων καὶ τῶν ἰδιωτῶν ψηφίσματι περιβάλλοντας** ('It is necessary to collect these (livers) from butchers and private individuals by including them in a decree (to that effect)'). On *mageiroi* see generally LSJ s. v., and Dalby, *Food* 213 (under Meat): 'Greek terms for 'butcher' (*boutypos, artamos, mageiros*) all have religious overtones. *Mageiros* became the usual term, and included the sense of 'cook', since the tasks involved extended from supplying and sacrificing the chosen animal, through preparing it for the sacrificial feast, to abstracting and re-selling the offal'. (A study in depth is G. Berthiaume, *Les rôles du Mageiros. Étude sur la boucherie, la cuisine et le sacrifice dans la Grèce ancienne* (Leiden 1982).). The sort of public decree Ph. mentions will have forestalled and varied the last link in Dalby's chain of everyday transactions.

The noun ἰδιώτης is used by Ph. only here. The verb περιβάλλειν occurs five other times in the treatise, but always in a more concrete sense than here: so already A51.3–5 [*83.36–38*] and again B9.4–5 [*86.51–87.1*], D10.3–4 [*97.21–22*], D48.3 [*100.19*] and D89.2 [*103.26*].

B6–9 [86.39–87.1]: sunken grain-pits

B6.1–2 [*86.39–40*] **Τὰς δὲ κριθὰς δεῖ καὶ τοὺς πυροὺς <φυλάσσειν>** ('Barley and wheat it is necessary <to protect>'). The infinitive has been a standard supplement in all editions since Schoene.

For barley see already under B1 **κάγχρυ**; and for 'wheat (still) in its sheaves' under B1 **τὸν ἐν τοῖς**. The topic now addressed, at full length, is the conservation of both of these key cereals in their post-threshing and -winnowing state. (Those twin procedures, we may take it, are subsumed under the immediately ensuing phrase ὡς βέλτιστα καθάραντας. For the phraseology cf. e. g. Xen. *Oec.* 18.6, καθαροῦμεν τὸν σῖτον λικμῶντες.)

B6.3 [*86.41*] **σιροὺς ὡς βαθυτάτους ὑπαιθρίους ὀρύξαντας** ('digging open-air pits as deep as possible'). Schoene prints the transmitted σειρ-, here and in B26.3–27.6 [*88.5–13*]; Diels-Schramm and Garlan convert all four instances to the σιρ- form. (See also D43.4–5 [*100.5–6*].)

For grain-pits – whether or not 'open-air' ones – cf. (e. g.) fifth-century Athenian ones in IG i^3 78.10–12 (with G. Mylonas, *Eleusis and the Eleusinian Mysteries* (Princeton 1961) 125–127 + fig 36); fourth-century Thracian ones in Demosth. 8.45 (= [Demosth.] 10.16). See further below, under B8 **Ἐν τούτοις**.

It is noteworthy that none of the authors represented in the *Geoponica* mention grain-storage in pits. The assumed norm, rather, is (*sc.* raised) granaries/*horrea* – so 2.25.4, 2.27.t, 2.28.t, 2.30.t, 13.4.5 – as in the next section of Ph. See generally **Appendix 5**.

B6.4–7 [*86.42–45*] **τούτων τὸ ἔδαφος ἀλείψαντας ὅσον ἐπὶ τέσσαρας δακτύλους τὸ βάθος πηλῷ διειργασμένῳ καὶ ἠχυρωμένῳ καὶ κύκλῳ περιαλείψαντας ἀμόργῳ** ('smear the bottom of these, to a depth of four dactyls (7.7 cm.), with a well-worked mix of mud and chaff, and smear it all around with olive-pressing fluid'). Mixing mud and chaff was a procedure regular enough to generate its own verb, as here: ἀχυρόω; cf. e. g. lines 42, 72 and 82–83 of IG ii^2 463, the Athenian decree of 307/6 ordering a five-year schedule of repairs for the City, Peiraieus and Long walls (see under A14 **κατάστεγα**), and generally LSJ s. v. (Tarantinus in *Geop.* 2.27.3 advocates hair instead of chaff: see **Appendix 5**.) Further specifications about the mud are given in B7 [*86.45–47*], q. v. below. For 'olive-pressing fluid' see already under B3 **ἀράκους**.

The term ἀλείφειν reappears at B53.9 [*90.22*] (coating projectiles with poison) and D35 [*99.26–28*] (protecting wooden machines against fire). Compounds used are περιαλείφειν as here, διαλείφειν (see under B10 **ἐν ὑπερῴοις**), and especially καταλείφειν: B9.3–5 [*86.50–87.1*], B16.3–4 [*87.26–27*], B17.3–4 [*87.29–30*] and D80.4–5 [*102.43–44*].

B7.1–3 [*86.45–47*] **ἔστω δὲ τὰ μὲν δύο μέρη χνοῦ, τὸ δὲ ἓν ἄμμου εἰς τὸν πηλὸν ἐμβεβλημένα** ('and let there be two parts of powder and one of sand put into the mud'). On χνοῦς see generally LSJ s. v. It is a term with so many applications, so many of them vague and/or generic, that its sense here is uncertain. By translating it as 'Spreu', Diels-Schramm 41 appear to understand it as a second reference to the chaff that is already implicit in ἠχυρωμένῳ (see under the preceding lemma). My 'powder' follows Garlan 301 ('poudre') and sees, rather, another substance, not previously mentioned, whose function when combined with the clay and sand is to create a hard, cement-like base. Compare generally *Geop.* 2.27.3 & 7 (in **Appendix 5**).

B8.1–2 [*86.47–48*] **Ἐν τούτοις καλῶς ἔχει θησαυρίζειν, ἂν ὡς μάλιστα ξηρανθῶσιν** ('In these (pits) it is a fine way of storing, for maximum dryness'). For the term θησαυρίζειν – implying the idea of storing something especially valuable ("treasure") – in this context, cf. B27.6 [*88.13*] and elsewhere e. g. Xen. *Cyrop.* 8.2.24, Diod. Sic. 5.21.5, 36.11.1; note also other *thêsaur-* vocabulary pertaining to grain and granaries in papyri from the third century onwards (LSJ s. v. θησαυρός II.2; cf. Crawford, *Kerkeosiris* 46, 50, 128).

G. E. Rickman, *Roman Granaries and Store Buildings* (Cambridge 1971) 1–2 sets out the three cardinal functions of any granary *vel sim.* The grain must be kept dry ('The safe limit of moisture in stored grain is usually between 10 and 15%, depending upon the type of grain, the climate, and the length of storage'), cool ('if possible below 60° F [= 15.5° C]'), and free from vermin ('which tend to breed if the grain overheats'). Ph.'s *s(e)iroi* – and comparable ones elsewhere: see B6 under **σιρούς** – risk confusing the modern reader because of the widespead use of silos, a term derived from the ancient one, as 'pits or airtight structure[s] in which green crops are pressed and kept for fodder [a. k. a. silage], undergoing fermentation' (*Concise Oxford Dictionary* s. v.). The scenario in Ph. is entirely different: only the grain, threshed and winnowed, is stored, and fermentation (or any other biochemical process) is something to be avoided.

B9.2–3 [*86.49–50*] **δεῖ ὄξους κεράμιον ὡς δριμυτάτου εἰς τὸν μέσον ἄχρι τοῦ τραχήλου κατορύξαι** ('it is necessary to bury in the middle (of each pit), up to its neck, a pot of the most acrid vinegar possible'). For τράχηλος as the "neck" of a vessel (as opposed to a human or animal neck) see e.g. Hero, *Pneum.* 1–19 and passim, and generally LSJ s.v. II.2.

On vinegar see generally Dalby, *Food* 343. It earns a place in the list of important substances that Ph. wants his city to keep in good supply (B52.4 [*90.11*]). He has other, similar uses for it in B10.7 [*87.8*], B54 [*90.24–27*], and (as a fire-retardant, from the attackers' perspective) D34.5–6 [*99.25–26*].

A vinegar-filled vessel is recommended for this purpose in *Geop.* 2.30.3 (Damegeron): see **Appendix 5**.

B9.4 [*86.51*] **<ἐν> κωνοειδεῖ σχήματι** ('<in> a cone-like shape'). A striking, Archimedean (*Con.Sph.*, passim) phrase, here employed in a pragmatic context. If Ph. knew why a conical lid for these vinegar-filled pots (Diels-Schramm 41 fig.21) was necessary or desirable, he does not say so in the epitomized version we have.

B10–24 [87.2–51]: raised granaries

B10.1–3 [*87.2–4*] **ἐν ὑπερῴοις διαληλειμμένοις ἐν ἀμόργῳ τοὺς τοίχους καὶ τὸ ἔδαφος** ('in elevated (granaries) which have been coated in olive-pressing fluid on their sides and bottom'). The participle transmitted is διαλελειμμένους (sic), but διαλείπειν makes no sense in this context. What is needed is διαληλειμμένοις, from διαλείφειν: so Schoene (oddly ignored by Arnim, *Index* s.v.), accepted by Diels-Schramm 41 and Garlan 301.

Garlan 369 n.10*a* declares ὑπερῴοις difficult to translate. His point would carry more force if he followed Arnim, *Index* s.v., in classifying it here as a neuter noun; both Diels-Schramm (41: ('in oberirdischen Speichern') and Garlan himself (301: 'dans des constructions aériennes') understand it as an adjective, rightly in my opinion. In any event, whether adjective or noun, the term suffices to convey the basic point that the granaries envisaged in B10–24 [*87.2–51*] – wooden in B10 [*87.2–8*] (see under B11 **Ἐὰν δὲ ξύλων**), stone-and-brick thereafter – are contrasted in that cardinal regard with the sunken pits of B6–9 [*86.39–87.1*]. The feature is in fact long-established and widespread; cf. ἐν ἀνωγέοις in *Geop.* 2.27.1 (**Appendix 5**). As Garlan notes, G.E. Rickman's survey of the archaeological remains of grain-stores at Roman military sites in Britain and Germany shows them typically elevated (on posts). See Rickman, *Granaries* 215–250 (with his Appendix 1: *suspensurae*), and also 250–257 on the best-attested precedents and parallels for designs of this kind ('long narrow buildings with raised floors'). They begin extraordinarily early, with the rectangular Bronze Age granaries of burnt and sun-dried brick raised on miniature walls found at Harappa and (subsequently) other centres of the Indus Valley civilisation, but for present purposes the key site is the akropolis of hellenistic Pergamum; there, between the 280s and the (?)150s, at least five rectangular 'arsenals' (grain storehouses) were built, on stone foundations with raised wooden floors. (Details in A. von Szalay and E. Bohringer, *Altertümer von Pergamon, X: die hellenistische Arsenale* (Berlin 1937).) See further under the next lemma and under B11 **λαβεῖν**.

A role (as a pesticide) for olive-pressing fluid in the preparation of granaries is one of the relevant recommendations made in *Geop.* 2.27.7: see, again, **Appendix 5**.

B10.3–4 [*87.4–5*] **καὶ τὰς θυρίδας ἔχουσι καὶ διεκπνοὰς πλείους ἐστραμμένας πρὸς βορρᾶν** ('they also have windows and numerous ventilation-holes facing north'). Ventilation had not been catered for – nor indeed was it possible – in the subterranean *s(e)iroi*, and one cannot but think this a conceptual and practical weakness in them (unless for very short-term storage); it risked rendering the grain susceptible to premature germination/fermentation or mildew (or both). Such risks appear to be mimimized with the design proffered here. Adequate air-flow is a corollary of the raised position as well as the extra apertures (the latter facing north, to let in wind but not direct sunlight; cf. *Geop.* 2.27.2 (**Appendix 5**), and compare generally the drying of livers 'in the shade', B4.1–2 [*86.35–36*]). On ventilators in the archaeologically-attested granaries cited under the preceding lemma see Rickman, *Granaries* 255 with fig.62 (Harappa), 254 (Pergamum), 224 and 232–233 (Roman Britain), and 248 (Roman Germany). On windows, considered separately, see Rickman's General Index s.v.

In the present context, what (if any) distinction Ph. intends between *thurides* and *diekpnoai* – a uniquely concrete use of that latter noun – is obscure.

B10.6–7 [*87.7–8*] **ὁ πυρὸς <δ' οὐ> σήπεται τεθέντος ὡσαύτως ὄξους** ('<and> the wheat does <not> rot when, similarly, vinegar has been introduced'). The sense does require Schoene's supplement, now standard.

'Similarly' is a reference back to B9.2–3 [*86.49–50*].

B11.1 [*87.9*] **Ἐὰν δὲ ξύλων σπανίζωμεν** ('Should we be short of timbers'). See under B10 **ἐν ὑπερῴοις**.

After the elusive terminology of B10.1–2 [*87.2–3*], Ph. now (and from now on) adopts a term that can unproblematically be rendered 'granary': masculine σιτοβολών, again at B17.2 [*87.28*], B24.2 [*87.50*], and B28.2 [*88.15*]. Note LSJ s.v. on the four very similar *sitobol-* nouns attested. For Ph.'s σιτοβολών cf. e.g. Septuagint *Genesis* 41.56 (Joseph opens the Egyptian ones during the famine); IG xi.2 287 A170 (Delos, third century); PSI 4.358.9 (third century); Florentinus (third century CE) in *Geop.* 2.25.4.

B11.3–5 [*87.11–13*] **λαβεῖν τὸ ἥμισυ τοῦ πλάτους καὶ τοσούτου ὕψους ἡμικύκλιον ποιῆσαι** ('take half of the breadth and make a semicircle of the same height'). Hypothetical ground-plans of what Ph. begins to describe here are given by Diels-Schramm 42 fig.22 and Garlan 370 fig.62. The description is textually deficient at times (see esp. under B12 **ἔστω**) and not always intelligible even where there are no such lacunae. Nevertheless I agree with Garlan 370 n.11*c* that the phrase λαβεῖν τὸ ἥμισυ τοῦ πλάτους in this first sentence permits the inference that Ph.'s proposed granaries are rectangular, as was the norm (B10 under **ἐν ὑπερῴοις** and **καὶ τὰς θυρίδας**). Note in any case τετράγωνον in B15.3 [*87.23*].

Such a 'semicircle' will be referred to throughout the rest of B11–19 [*87.9–36*] as an arch, ἀψίς: see the next two lemmata (and B14 **Ὅταν**). Perhaps Ph. uses that word here, rather than ψαλίς (A17.2 [*80.46*], A47.1 [*83.23*], and cf. B23 [*87.47–49*]), in order to underline the point that he does mean ἡμικύκλιον literally in this granary design: 'un arc en plein cintre' (Garlan 370 n.11*d*), as depicted in the end elevations of the two-storey and single-storey models in Diels-Schramm 42 fig.22. For general bibliography and discussion see under A17 **εἰς ψαλίδας**.

B12.1–2 [*87.13–14*] **δεῖ <διὰ> τριῶν πηχῶν οἰκοδομεῖν ἐφ᾽ ἑκατέρου τοῦ τοίχου ἀψῖδας πλινθίνας** ('it is necessary to build, every three cubits (1.386 m.) on each side, arches of blocks'). In this context the adjective πλινθίνας cannot mean brick arches; B13 [*87.18–20*] will speak unambiguously of stone. See generally under A7 **πλινθίνους**.

B12.3–6 [*87.15–18*] **ἔστω δὲ πλάτη αὐτῶν <...> δύο πλίνθων ἐπιτεθεισῶν ἐπὶ τῶν θεμελίων τὰς ἀψῖδας ἐξῆχθαι δεῖ ὅσον πῆχυν τῷ μήκει· <...> τῷ δὲ πλάτει δίπηχυ ποιητέον** ('let the breadth of them be <...>; when two blocks have been put in on the foundations it is necessary that the arches be brought out to a length of a cubit (0.462 m.); <...> is to be made two-cubit (0.924 m.) in breadth'). As can be seen, two quantified dimensions are preserved, but amongst the detail that has been lost are certainly one and possibly two more. Schoene's suggestions (confined to his apparatus) for filling the two perceived lacunae were <δύο πήχεων· καὶ> and <τῶν δὲ θεμελίων τὸ ὑπὲρ γῆς πηχυαῖον τῷ ὕψει vel μήκει>. Neither Diels-Schramm 42–43 nor Garlan 302 admit these supplements into their texts, though the translation in Diels-Schramm does, tacitly, incorporate the first of them.

In substantive terms, Garlan's suggestion (370 n.12*c*) that the two blocks placed on the foundations were intended to provide under-floor ventilation (cf. under B10 **καὶ τὰς θυρίδας**) is a persuasive one.

B13.1–3 [*87.18–20*] **Τοῦτο δὲ ἔστω ξεστῶν λίθων ἢ συγκρουστῶν ὡς μεγίστων, ἵνα δύνηται τὰ βάρη φέρειν** ('Let this be (built) of stones hewn or rough, as large as possible, in order that the weights can be sustained'). 'Hewn' stones, again in B21.1–2 [*87.40–41*], are mentioned from Homer onwards: see *Iliad* 18.504, *Odyssey* 3.406, and elsewhere e.g. Hdt. 2.124.4–5, Xen. *Anab.* 3.4.10. The second descriptor has no literary parallels which use συγκρουστός in this sense (and LSJ s.v. does not register the passage), but both Diels-Schramm 43 (apparatus) and Garlan 370 n.13*a* cite an epigraphic one, in the shape of a funerary *homos* from Eumeneia (Roman imperial period): E. Legrand and J. Chamonard, 'Inscriptions de Phrygie', *BCH* 17 (1893) 241–293, at 243 no.7 (now IGR IV 737), lines 3–4.

I concur with Garlan 302 in taking ὡς μεγίστων with both types of stone mentioned; Diels-Schramm 43 confine it to the second.

B14.1–2 [*87.20–21*] **Ὅταν δὲ συναχθῶσιν αἱ ἀψῖδες, ἐπὶ τῶν θεμελίων ὀρθοὺς οἰκοδομῆσαι τοίχους** ('When the arches have been brought together, build upright sides on the foundations'). Rickman, *Granaries* 2 stresses the importance of strong side-walls in any granary: 'if grain is stored loose or in bins, the walls of a grain

store must be capable of supporting considerable lateral thrust. So, far example, the walls of a container holding 30 tons of grain must be able to resist a pressure of 20 tons'. In Ph's design, strength is achieved by the step described in B15.1–3 [*87.21–23*]: packing the space between the upright sides and the arches with bricks.

B16.2 [*87.25*] **στρωτῆρας ἐπιβαλεῖν** ('to insert rafters'). Again B17.3 [*87.29*], with the same idiom στρωτῆρας ἐπιβαλων, and B18.2–3 [*87.31–32*], οὐθὲν στρωτήρων προσδεήσεται. (The distinction seen here by Maier 2.90 – between 'Tragbalken eines Holzbodens' in B16 and B18, and mere 'Sparren' in B17 – seems to me otiose.) For this term cf. e.g. Plb. 5.89.6 with HCP 1.620 (one of Antigonos Doson's gifts to Rhodes after the 227 earthquake: στρωτῆρας ἑπταπήχεις πεντακισχιλίους) and in building-acounts from Eleusis (IG ii^2 1672/Maier no.20, line 63, plural and singular) and Epidauros (IG iv^2 1 102, line 235).

B16.3 [*87.26*] **ἄνωθεν κάλαμον** ('reed at the top'). B26.2 [*88.4*] uses the feminine καλάμη. Neither Diels Schramm ('Rohr' in both passages) nor Garlan ('roseau' in both passages) see a substantive distinction. I give different equivalents (here 'reed', there 'straw'), in case Ph. intended one.

In the present context, describing layers of reeds in building contruction, Ph.'s *kalamos* is a term more usually found elsewhere as (plural) *kalamides*; LSJ s.v. and Orlandos, *Matériaux* I 24 with n.1 give epigraphic instances; but for *kalamos* cf. e.g. line 68 of the Athenian wall-repairs decree IG ii^2 463 = Maier no.11 (see A14 under **κατάστεγα**), ἐπιβαλὼν [κ]άλαμον λελαμμένον.

B17.1 [*87.27*] **ἐπὶ τούτοις** ('on these'). The grammatical antecedent of this phrase is presumably the rafters of B16.2 [*87.25*]. Resting upon them, if this upper chamber is to be built, there must be a very robust horizontal structure – involving both joists and more rafters – as its ὀροφή (B17.2 [*87.28*]), the ceiling of the lower granary and the floor of the upper.

B17.3 [*87.29*] **κεράμωσον** ('tile'). On tiling see generally Orlandos, *Matériaux* I 81–83, with copious documentation. In the present instance the manuscripts have κεράμωσον ἢ κατάλειψον ὡς βέλτιστα (the latter phrase echoing καταλεῖψαι ὡς βέλτιστα in B16.3–4 [*87.26–27*]), i.e. the processes of tiling and plastering are given as alternatives. Diels's emendation of ἤ to καί is adopted by Garlan 302 as well as Diels-Schramm 43. Schoene was satisfied with the paradosis, perhaps rightly. (If both procedures are involved, they seem at the least of it to be mentioned in the wrong order.)

B18.1–2 [*87.30–31*] **συνεχῆ τὴν οἰκοδομίαν ὥσπερ καμάρας ποιεῖν** ('make the building(-process) continuous just like barrel-vaults'). Involving as it does one of Ph.'s favourite multipurpose adjectives (cf. A13.1–3 [*80.28–30*], A61.1–3 [*84.13–15*], A65.1–3 [*84.28–30*] (adverb), D26.3–4 [*98.47–48*], and frequently in *Bel.*), the phrase 'make the building(-process) continuous' is uninformative in itself, but the addition does clarify matters. A καμάρα, Latin *camara* or *camera*, is yet another way of describing a vault or arch; specifically a 'voûte en berceau' (Orlandos, *Matériaux* II 235, with documentation in n.3 there), a barrel vault.

B19.1–2 [*87.32–33*] **Ἵνα δέ σοι εὔρυθμα γένηται τὰ οἰκοδομήματα κτλ** ('In order that your buildings be harmonious etc.'). Achieving this aim – which is immediately glossed as ensuring that the buildings have a proportionate height-to-size ratio (ἔχοντα σύμμετρον τὸ ὕψος τῷ μεγέθει) – involves repeating this aspect of the instructions already given in B11–12 [*87.9–18*] but now expressly elevated to a general principle, irrespective of any particular dimensions. It is noteworthy that Ph. espouses such a principle, and that he applies it even to a notionally mundane public project such as a granary.

His general view on harmoniousness in buildings – likewise expressed by calling them εὔρυθμα – had already been set out in a discursive passage in *Bel.* (50.45–51.11): he insists there that what is accepted as such can only have been the outcome of a long process of experimental trial and error, not predetermined at the outset.

B19.5 [*87.36*] **ὅσον εἰρήκαμεν** ('to the extent we have stated'). At B11.3–5 [*87.11–13*].

Garlan's 'comme' (302) is not quite precise enough for ὅσον; cf. rather 'so gross, wie' (Diels-Schramm 43).

B20.1 [*87.37*] **<…> Ἐὰν δὲ προέλῃ κτλ** ('<…> If you prefer etc.'). Garlan 302 marks no lacuna here, but I am inclined to think that Schoene and Diels-Schramm 43 were right to do so. While the verb 'prefer' does not, of itself, guarantee a prior mention of something, *x*, over which something else, *y*, is being favoured, the negatives here (μήτε μονόλιθον … μήτε ξύλινον) do seem to suggest that alternative entrance-designs have already been proffered, before the one now to be described.

B20.3–4 [*87.39–40*] **ἐξοικοδόμησον πλίνθοις** ('build (it) up with bricks'). Schoene was content with the transmitted ἐξοικοδόμησον πύργους, but 'towers' have no place here. (Perhaps a scribal error stemming from πυργοποιίαις in B23.1–2 [*87.47–48*].) This is Rochas d'Aiglun's alternative, accepted by Diels-Schramm 44 and Garlan 302. Another option (Brinkmann ap. Schoene) is εἰσοικοδόμησον πλίνθους, 'build bricks in', modelled on ἐσῳκοδόμουν ἐς αὐτὸ [a wall] πλίνθους in Thuc. 2.75.4. Either way, a mention of bricks does seem needed, given the comment in B22 [*87.45–47*] that the structure described in B21 [*87.40–45*] will be stable once it is complete and 'the bricks which were inserted into the doorway' have been removed.

B21.1–3 [*87.40–42*] **ἄνωθεν τιθεὶς ξεστοὺς λίθους ἔγκλισιν ἔχοντας, τοὺς μὲν εἰς ἀριστερὰ τοὺς δὲ δεξιά** ('when you have placed on top hewn stones which have an incline, some to the left and others to the right'). For 'hewn stones' see under B13 **Τοῦτο**.

This participial phrase and what follows it (ἐκ τοῦ μέσου κατάκλεισον ἄνωθεν μὲν λίθῳ εὐρεῖ, κάτωθεν δὲ στενῷ ἐναρμόσας ὥσπερ σφῆνα) together, as Garlan 371 n.21*a* points out, make up a recognisable description of what Orlandos, *Matériaux* II 194–229 calls a 'voûte à inclinaison' (inclined or sloping vault) – a phrase Orlandos seems to have coined, in fact, on the basis of this very passage of Ph. and its employment of the term ἔγκλισις (in a particular, technical version of the primary sense registered by LSJ s.v. I.1). It means one secured at the top with a wedge-shaped keystone. Diels-Schramm 44 fig.23 and Garlan 371 fig.63 are identical depictions of what this looked like in its completed form. See further under the next lemma, and B23 under **Χρήσιμον**.

B21.3–6 [*87.42–45*] **ἐκ τοῦ μέσου κατάκλεισον ἄνωθεν μὲν λίθῳ εὐρεῖ, κάτωθεν δὲ στενῷ ἐναρμόσας ὥσπερ σφῆνα** ('close off (the structure) at the top, in the middle, with a broad stone, fitting (it) in at the bottom in a narrow (space) just like a wedge'). This instruction, overly compressed in its transmitted version, draws on vocabulary that Ph. had used to describe artillery-building in *Bel.* For κατακλείειν see 73.48, 74.27, 74.32, 74.42 & 44, all in the description of the 'repeating catapult' (Marsden) invented by Dionysius of Alexandria; the sense of securing a piece of masonry has an epigraphic parallel in lines 157–159 of Syll.^{3} 972 (IG vii 3073), a building contract for the temple of Zeus at Lebadeia, dating from 175–172. For ἐναρμόζειν see *Bel.* 74.25 and 75.42, likewise in the section on Dionysius's *polybolos katapaltês*. Wedges had been more copiously mentioned in the earlier treatise, and throughout it: 25 instances between 56.19 and 78.7 (and cf. the 'wedge-shaped mouth' of a punch at 67.8 and the verb ἀποσφηνοῦν at 76.25).

B22.1–2 [*87.45–46*] **ἔξελε τὰς εἰς τὸν δίοδον ἐμβληθείσας πλίνθους** ('remove the bricks which were inserted into the doorway'). See under B20 **ἐξοικοδόμησον**.

B23.1–3 [*87.47–49*] **Χρήσιμον δὲ τοῦτο καὶ ἐν ταῖς πυργοποιίαις, ἀντὶ τῶν ψαλίδων ἐάν τις βούληται οὕτως κατασκευάζειν τὰς πυλίδας** ('This (procedure is) useful in fortification-systems too, if instead of vaults anyone wants to build posterns thus'). On posterns see generally under A9 **τὰς πυλίδας**. As regards the present passage, Ph.'s pronoun 'this' (τοῦτο) is frustratingly vague. If he meant by it the entirety of what B21 [*87.40–45*] has described, one must echo the comment in Garlan 371 n.23*b* that no surviving posterns demonstrably combine the 'voûte à inclinaison' design (Orlandos, *Matériaux* II 194–229, esp. 217 ff.) with a keystone at the apex (instances – with semicircular arches – in *Matériaux* II 241–254). In any event, τοῦτο might refer to one or the other of those elements rather than to their combination; alternatively, not to the substance of B21 at all but to the bricks-first building method (B20.3–4 [*87.39–40*] plus B22 [*87.45–47*]).

B25–29 [87.51–88.20]: additional advice on grain-conservation, pits and granaries

B25.1–4 [*87.51–88.3*] **Τυγχάνει δὲ τοῦ σίτου ἀπαθέστερος ὁ σπαρεὶς καλῶς εἰς κατειργασμένην γῆν καὶ θερισθεὶς ξηρὸς καὶ μείνας ἐν τοῖς δράγμασιν ὡς πλεῖστον χρόνον** ('There are circumstances in which grain will be more unaffected when it has been sown rightly into well-worked earth and harvested dry and remains in the sheaves for as long a time as possible'). With ἀπαθέστερος here cf. already B4.3 [*86.37*]: livers, dried in the way recommended, remain ἀπαθέστερα.

Wheat still in its sheaves (τὸν ἐν τοῖς δράγμασι πυρόν) has been listed amongst storable ἄσηπτα in B1.3–4 [*86.23–24*]; now other factors are added. For 'well-worked earth' cf. e. g. in Plut. *Mor.* 453B (a simile to illustrate gentle behaviour), and frequently in papyri (with γῆ implicit); also ἡ τῆς γῆς κατεργασία in Thphr. *CP* 3.20.1. Though how the condition of the soil is a relevant consideration in the present passage is not immediately clear, probably the whole phrase that Ph. uses, σπαρεὶς καλῶς εἰς κατειργασμένην γῆν (Schoene notes Brinkmann's tentative suggestion of εἰς καλῶς, but the parallel of Thphr. *CP* 3.20.6 is not conclusive), implies early ripening in optimal circumstances, the latter also suggested by 'harvested dry'. (On dryness of grain as a desideratum Garlan 371 n.25*a* aptly cites one of the clauses (lines 15–18) in IG xii Suppl. 644, an edict instructing *oikonomoi* to make provision for the Macedonian garrison in Chalkis at the end of the third century (cf. C. B. Welles, 'New texts from the chancery of Philip V of Macedonia and the problem of the "diagramma"', *AJA* 42 (1938) 245–260, at 252): Καὶ τὸμ μὲν σῖτον ἀναγέτωσαν ἀπὸ τῆς νέας προσόδου ἄβροχον καὶ εὐθέως συντασσέτωσαν διαπάσσειν τῆι γῆι τῆι Χαλκιδικῆι.)

B26.2–3 [*88.4–5*] **ἐκ καλάμης ὠλένας ποιήσας κύκλῳ περὶ τοὺς σιροὺς περιτείνῃς αὐτούς** ('if you make mats out of straw and spread them in a circle round the pits'). Unless the vocabulary has become hopelessly muddled, B26–27 [*88.3–14*] do return to the open-air *siroi* of B6–9 [*86.39–87.1*], before B28–29 [*88.14–21*] add more points about the *sitobolônes*.

On reed or straw (B16 under **ἄνωθεν**) ὠλένες see generally LSJ s. v. ὠλήν, illustrating their several uses, attested primarily in papyri, besides the one Ph. mentions here.

Placing these 'round' (περί) the pits seems bound to mean, in the circumstances, lining the sides of the pits with them. If so, this expedient (continued under the next lemma) looks like an alternative, rather than an addition, to steps advocated in B6–9. B27 [*88.8–14*] will suggest yet another approach. Overall, Ph. gives the impression of drawing on a plurality of sources for this material, with no attempt to harmonize or rank the procedures mentioned.

B26.4–6 [*88.6–8*] **εἶτ' ἀργιλώδει πηλῷ διαπάττων ἐμβάλῃς τὸν σῖτον <ἢ> ἥπατα ἐλάφου ξηρὰ κατατεμὼν μικρὰ ἐμβάλῃς** ('then put in the grain, sprinkling (it) with clayey mud <or> cutting up dried deer's livers and putting in small pieces') The omission of <ἤ>, supplied by Buecheler ap. Schoene and now standard, is easily explained by the ἥπατα following. Two options are being proffered here. The first of them is illuminated in a general way by Thphr. *HP* 8.11.7 (δοκεῖ δὲ καὶ γῆ τις εἶναι παρά τισιν ἣ διαπαττομένη συντηρεῖ τὸν πυρόν), which justifies Schoene's διαπάττων here for the transmitted διαπλάττων. (See also *Geop.* 2.27.3 in **Appendix 5**.) The second, though, is a mystery, twice over: why Ph's source on this matter thought that deer liver needed to be specified, and (cf. Garlan 371 n.26*b*) how the procedure was supposed to be efficacious. (One can at least think that ἥπατα ἐλάφου would be widely available: see M. Mackinnon, 'Fauna of the Ancient Mediterranean World', in G. L. Campbell (ed.) *The Oxford Handbook of Animals in Classical Thought and Life* (Oxford 2014) 156–179, at 160–161. Contrast e. g. Jul. Afr., *Kest.* 3.1.1–2, where horses suffering from elephantiasis need to be given the sun-dried liver of a hedgehog.)

B27.2 [*88.9*] **τὰ ὄσπρια** ('pulses'). Again at the end of this long sentence: B27.6–7 [*88.13–14*], by which time the initial association with wheat and barley seems to be set aside. (On the practical importance of storing 'barley and wheat and pulses' separately, to avoid everyday *ataxia*, see Xen. *Oec.* 8.9.) A generic term, calling for a translation broader than 'Bohne' (Diels-Schramm 45); cf. Hdt. 2.37.5 (Egyptian priests 'cannot tolerate even the sight of beans, considering it [*sic*] an impure *osprion*'). Garlan 303 has 'légumes', on which see also Dalby, *Food* 194 (placing in this category several of the items separately mentioned by Ph. – see below – alongside others that he does not expressly mention, such as beans and lentils); cf. Athen. *Deipn.* 9.406B-408B. In general, the addition of legumes or pulses to the traditional "Mediterranean triad" of grain, grapes and olives is now well-established; see e. g. Garnsey, *Food* 12–21, esp. 15. In Ph., some particular ones have already been included among the ἄσηπτα of B1.3–7 [*86.23–27*] with B3 [*86.32–35*]; see the Comm. thereto.

Diod. Sic. 20.96.1 records a massive shipment of *sitos* and *ospria* by Ptolemy I to Rhodes during the 305–4 siege. (And compare generally Plut. *Mor.* 293D: during a drought and famine in early Delphi, its (unnamed) king issues *alphita* and *chedropa*.)

B27.3 [*88.10*] **τὸν τοῦ τήλεως καρπόν** ('the fruit of the fenugreek'). On fenugreek (*Trigonella foenum-graecum*) see generally Dalby, *Food* 142. Despite its name, it is native not to the Aegean but to the Near East and Egypt (where it was 'a fodder crop for rapid fattening and the seeds were probably also used in broth, still a staple food of the fellahin': Crawford, *Kerkeosiris* 113); nevertheless it is mentioned – under several names – in Greek sources from, apparently, the late fifth century onwards (fenugreek flour in Hipp. *Epid.* 5.1.68 and 7.1.65). Here Ph. acknowledges the value of its seeds not as a foodstuff *per se* but as a preservative, when ground. (In the *Geoponica* it does not feature in the sections on granaries, but cf. elsewhere 2.18.11, 3.15.2, 6.7.1, 7.12.6, 7.20.7, 7.24.1, 8.14.1, 9.25.3, 12.1.11, 12.6.1, 14.19.3, 15.6.1, 18.2.6.)

There is no call to think that Ph. had in mind for it the sort of directly military use illustrated by Joseph. *BJ* 3.277: at Iotapata in 67 CE, boiled fenugreek poured onto the planks across which the attacking Romans were approaching made them too slippery to keep a footing on. (See also *Sylloge tacticorum* 53.7 for 'boiling pitch and oil and fenugreek' to be used against ladders.)

B27.5–6 [*88.12–13*] **τὴν κόνυζαν ἢ τὴν ὀρίγανον ὡς ἔχει διαμίσγων** ('by mixing through fleabane or oregano in its natural state'). Like other appended phrases of its kind in Ph., this ὡς ἔχει – for which see already B3.2 [*86.33*], of *arakoi* – can be taken either with both of the items which precede it (so, apparently, Diels-Schramm 45) or solely with the second (so Garlan 303). In the present instance I see no means of adjudicating with certainty, but the burden of proof arguably rests on advocates of the latter view; both plants mentioned would appear equally suitable to use ὡς ἔχει (as opposed to being dried, or processed in some other way).

The first of them, κόνυζα (Latin *conyza* in Pliny and elsewhere), is glossed very specifically by Garlan 371 n.27*b* as *Inula graevolens* (a.k.a. stinkwort), but Ph. may not have intended anything so precise; according to LSJ s.v., κόνυζα embraces various species of *Inula*. The everyday English term fleabane, in any event, testifies to its long-established efficacy as an insect repellent. See e.g. Thphr. *HP* 6.2.6 (noting the special suitability of the acrid female plants for this), Diosc. *de mat.med.* 3.121.1, Gal. *de simpl.medic.temp.* 12.35.8–36.3, and cf. Dalby, *Food* 241: 'asphodel and fleabane [...] were good to lie on at open-air feasts, since they repelled venomous creatures'. For fleabane in the *Geoponica* see 2.4.1, 2.27.9 (**Appendix 5**), 8.10.t, 13.11.3, 13.11.10, 13.15.2, 18.2.4–5.

Of the relevant properties of oregano (Hipp. *de diaeta i–iv* 2.54.37–38, *Epid.* 5.1.54 = 7.76.6; Diosc. *de.mat.med.* 3.27–29; Dalby, *Food* 243–244) and its like, Garlan 371 n.27*c* singles out that of a dehydrating agent (so e.g. [Aristot.] *Probl.* 926b32–927a2). Again one could add the effectiveness of its strong smell in keeping off insects, nowadays typically mosquitoes. For oregano in the *Geoponica* see 2.29.1 (**Appendix 5**), 6.14.1, 10.90.1, 12.19.9, 13.4.2, 13.10.3, 13.10.5, 13.11.5, 13.12.5, 14.12.1, 14.17.7, 15.1.17, 15.1.24, 15.2.13, 15.8.1, 16.4.3, 20.2.1, 20.2.3, 20.3.1, 20.4.2, 20.46.5.

The verb διαμίσγειν, as opposed to διαμιγνύναι, is typical of medical writers; other instances are almost entirely confined to the Hippocratic corpus (*Epid.* 7.1.105; *de mulierum affectibus i–iii* 1.64.11–12) and – post-Ph. – to Galen and ps.-Galen. On vocabulary of this kind see further at B36 under **τὰς σκίλλας**.

B28.1–3 [*88.14–16*] **κἂν οὔρῳ ἔξωθεν ἐπιρρύτους ποιήσῃς τοὺς σιτοβολῶνας, διαφυλάττουσιν ἀφθάρτους τοὺς καρπούς** ('and if you create the granaries flowing with urine from the outside, they will keep the crops decay-free'). The phrase κἂν οὔρῳ is Schoene's emendation, accepted by all, of the meaningless paradosis καδούρω.

Diels-Schramm 45 n.1 gave space to Schramm's belief that the οὔρῳ thereby produced is the dative of LSJ's οὖρος (A), *fair wind*, attested mainly in epic and other poetry but not unknown in prose (e.g. Xen. *Hell.* 2.3.31, an image illustrating the wayward political behaviour of Theramenes). However, both Diels in that same note and Garlan 371 n.28*a* understand οὔρῳ as the dative of LSJ's οὖρον (A), *urine* – as indeed Schoene himself had supposed, when adducing another passage from the *Geoponica*'s discussion of granaries and grain storage: 2.27.5 (in **Appendix 5**). (Other uses of urine in the *Geoponica* are many and various: see 2.18.16, 2.22.1–2, 3.3.4, 3.13.3, 5.9.4, 5.26.7, 5.34.3, 5.35.1, 5.36.3, 5.37.1, 5.49.2, 9.10.1, 10.18.3–4, 10.19.1, 10.34.1, 10.59.2, 10.61.1, 10.64.2, 10.84.2, 10.89.2, 10.90.3, 11.7.7, 12.8.3, 14.12.1, 14.17.7, 16.9.7, 16.10.1–2, 16.15.2, 16.21.10, 17.12.4, 17.20.4, 17.22.1, 17.23.1, 17.24.1, 18.15.3–4, 18.15.6.)

That said, what Ph. has in mind here falls short of being self-explanatory, particularly as regards the relationship between the adjective ἐπιρρύτους – which is what editors have made of the transmitted ἐρρύτους and ἐπιρρύτους – and 'urine' in the dative. (No application of ἐπίρρυτος registered by LSJ, where the present passage is not cited, seems obviously relevant.) Diels's note expresses his assumption (which I would join Garlan, and before him Lammert, 'Kriegswesen' 58, in sharing)

that 'Kanäle in das Innere des Silos [*sic*] führen, die, ohne mit dem Getreide in Berührung zu kommen, die ammoniakalischen Dämpfe der Jauche zur Abwehr des Ungeziefers im Innern verbreiten'; oddly, however, his and Schramm's translation ('Auch wenn man die Getreidebehälter mit Luftzuschluss von aussen herstellt') shows a reluctance to abandon the 'fair wind' interpretation of οὔρῳ (above). Garlan 303 has 'si tu assures, dans les greniers à blé, la circulation de purin venant de l'extérieur'. My own translation is closer to Ph.'s (awkward) Greek but is essentially intended to mean the same.

For urine in the plural see under B43 **κάθαρσιν**.

B29.1 [*88.16*] **τὰ τοιαῦτα οἰκοδομήματα** ('buildings of this kind'). Granaries, in short, with (as mentioned) ceilings, which could accommodate the feature here described.

Expanding on what Ph. himself leaves implicit, Garlan 371 n.29*a* observes that filling granaries from above, through funnels, would have the particular advantage of ensuring that the grain did not pile up to excess against the walls. Against that, funnels offered another entry-route for birds and other creatures, unless they were equipped with a means of closure; cf. B10.4–6 [*87.5–7*].

For χῶναι of other kinds in the treatise see C52.3 [*94.42*] and D53.3 [*100.35*], with the Comm. in both instances.

B30 [88.20–25]: strategic policy on the stockpiling of grain

B30.1–2 [*88.20–21*] **Τίθεσθαι δὲ προσήκει μὴ ἔλαττον εἰς ἐνιαυτὸν τὸν σῖτον τὴν πόλιν** ('It is appropriate for the city to deposit grain (enough) for no less than a year') This, elaborated in the rest of B30 [*88.20–25*], is the core of Ph.'s food policy, but it has generated rather little modern discussion, in what is otherwise a substantial bibliography on the general topic of the extent to which Hellenistic cities sought to regulate their supplies and stocks of grain, occasionally employing public policy alongside private initiative to do so. Garlan 372 n.30*a* (and cf. already Garlan, 'Cités' 23 n.28) cites two classic studies by L. Robert ('Inscription de Messénie', *BCH* 52 (1928) 426–432 [= *Opera Minora Selecta* I. 108–114]; review of P.M. Fraser, *Samothrace 2.1: the inscriptions on stone*, in *Gnomon* 35 (1963) 50–79, at 54–57), together with the Chalkis document mentioned at B25 under **Τυγχάνει**. Add now e.g.: Garnsey, *Famine* 81–84; U. Fantasia, 'Finanze cittadine, liberalità privata et *sitos demosios*', *Serta Historica Antiqua* 2 (1989) 47–84; L. Migeotte, 'Le pain quotidien dans les cités hellénistiques: à propos des fonds permanents pour l'approvisionnement en grain', *Cahiers du Centre G. Glotz* 2 (1991) 19–41 (cf. SEG 40.1646); F. Quass, *Die Honoratioren-Schicht in den Städten des griechischen Ostens* (Stuttgart 1993) 238–252; and cf. SEG 48.2116.

To illuminate Ph.'s specific recommendation, and to assess how realistic it is, one needs principally to address the matter of ensuring – or attempting to ensure – a full year's supply. In Syll.^{3} 344 (translations: Bagnall/Derow^2 no.7, Austin^2 no.48), a dossier of letters (c.303) from Antigonus I to Teos on the planned synoecism between Teos and Lebedos, clauses 10–11 (with Garnsey, *Famine* 71, and Chaniotis,

War 128–129), the king eventually agrees to various arrangements for managing a year's grain-supply, but only after admitting that 'previously we did not wish to grant grain-importing rights to any polis, nor for stockpiling of grain to occur' (ἡμεῖς δὲ πρότερον μὲν οὐ[κ ἐβουλόμεθα μηδεμιᾶι πό]|λει δίδοσθαι τὰ σιτηγήσια μηδὲ σίτου γίνεσθαι παράθε[σιν: lines 80–81). Other documents have various kinds of annual arrangements but not the specific one Ph. advocates here: thus for instance Syll.[3] 976, the celebrated Samian grain law of the (?)early second century (translations: Bagnall/Derow[2] no.75, Austin[2] no.135; analysis G. Shipley, *A History of Samos 800–188 BC* (Oxford 1987) 212–221; further bibliography at SEG 40.735); likewise IG v.1 1379, a second-century decree from Thouria, Messenia (cf. Robert, above, and the summary in Garnsey, *Famine* 81.). On the range and variety of fiscal mechanisms attested in this area see now L. Migeotte, *Les finances des cités grecques aux périodes classique et hellénistique* (Paris 2014) ch.3.II.1, with the review of J. Ma in BMCR 2015.08.27 (third paragraph).

Given suitable conditions, keeping grain for twelve months (or more: cf. εἰς πολλὰ ἔτη in *Geop.* 2.27.9, **Appendix 5**) was undoubtedly feasible. Besides the evidence cited already see e.g. [Aristot.] *Oec.* 2.1348b33–1349a2, an undatable anecdote from the history of Sely(m)bria, where the polis commandeers stored 'old' (*palaios*) grain from its citizens, leaving each of them a year's supply (ὑπολειπόμενον ἕκαστον ἐνιαυτοῦ τροφήν). Nevertheless, despite all the interest and importance of the individual documents cited above and others like them, a scenario in which it was the norm for Hellenistic poleis to exercize overall control over their grain supply is doubtful; and Ph.'s advice that cities themselves should routinely maintain a constant, full year's stockpile seems to belong in the realm of wish-fulfilment. (The verb which introduces it, Τίθεσθαι προσήκει, might imply a recognition of that, if we could be certain that he himself used it.)

See further under the next lemma.

B30.2–5 [*88.21–24*] **ἀγοράζειν δὲ δεῖ ὅταν εὐωνότατος ᾖ καὶ διελθόντος τοῦ χρόνου τὸν μὲν παλαιὸν ἀναλίσκειν, νέον δὲ ἄλλον τίθεσθαι** ('it is necessary to buy it when it is at the best price and, when the time has passed, to use up the old and to deposit new'). For 'old' grain see under the preceding lemma, third paragraph.

On the principle involved cf. generally Xen. *Mem.* 2.10.4: 'good housekeepers say that the right time to buy is when something of high value can be bought at a low price; now is when it is possible to acquire good friends very cheaply' (Οἱ μέντοι ἀγαθοὶ οἰκονόμοι, ὅταν τὸ πολλοῦ ἄξιον μικροῦ ἐξῇ πρίασθαι, τότε φασὶ δεῖν ὠνεῖσθαι. νῦν δὲ διὰ τὰ πράγματα εὐωνοτάτους ἔστι φίλους ἀγαθοὺς κτήσασθαι). In the case of grain, the 'best' – cheapest – price will normally apply immediately after harvest, when supply most exceeds demand.

Beyond that, what little Ph. reveals about the mechanics of his scheme raises questions without answers. Is the city to buy grain exclusively from its own citizens and producers, or from outside sources? And is it to be distributed free or merely at a subsidised price? An instance of a city raising revenues, apparently, by selling grain occurs in lines 5–9 of the grain-regulations (second half of the third century or somewhat later) from Samothrake mentioned under the preceding lemma; now most conveniently found as SEG 36.788 (printing the re-edition by J. Tréheux).

B30.5–6 [*88.24–25*] **πρὸς τὰς γινομένας πολιορκίας καὶ τὰς συμβαινούσας σιτοδείας** ('with a view to the sieges that occur and the food-shortages that take place'). For the second of these eventualities cf. B31.6–7 [*88.30–31*], κατὰ τὰς συμβαινούσας σιτοδείας. Even though Ph's subject in the present passage is grain, i.e. *sitos* in a narrow sense (B30.2 [*88.21*]), I have given *sitodeia* in both passages the broad translation that is usually appropriate (cf. LSJ s.v.). In B31.6–7 certainly, and perhaps here also, he is contemplating a siege-induced shortage of staple foods as a whole.

In the lacuna at B55.6 [*90.33*] – see B55 under **νῆες** – Schoene noted, though did not adopt, Vahlen's suggestion κατὰ πολιορκίαν ἢ κατὰ <σιτοδείαν>.

B31–47 [88.25–89.38]: foods, rations, recipes

B31.1–2 [*88.25–26*] **Χρήσιμον δέ ἐστι καὶ σκίλλας καὶ βόλβους ἐν ταῖς οἰκίαις ἀποτίθεσθαι** ('It is also useful to put away squills and *bolboi* in the houses'). For food-storage in individual houses as well as in communal facilities see already B1.1–2 [*86.21–22*], applying to the whole of B1–5 [*86.21–39*].

Squills (a.k.a. sea squills, sea onions) are the large bulbs, filled with a pungent juice, of the *Urginea maritima*. See e.g. Syll.[3] 968.VI (Mytilene, third century), ἐν τῶ χωρίω τῶ ἐπάνω τὰ σκιλλάω[ν καὶ σκορ]όδω(ν) φυτά (or: σκιλλάω[ν ἐπὶ τὰ] ὁδῶ φυτά); Diosc. *de.mat.med.* 2.171.1–4; and generally Dalby, *Food* 311.

Bolboi I leave untranslated, here and below, because of the difficulty of finding a simple English equivalent. They are not onions (or other alliums), which Ph. never mentions, but 'purse-tassels' (LSJ s.v.), the bulbs of the grape-hyacinth, *Muscari comosum*: Dalby, *Food* 63–64, anticipated xv–xvi. See e.g. Diosc. *de.mat. med.* 2.170.1–2 and the dossier of quotations in Athen. *Deipn.* 2.63D-67F. Aside from their specialized attribute as an aphrodisiac (Aristoph. *Eccles.* 1092; also Varro, Ovid and Petronius), *bolboi* are a well-attested culinary *opson* in the daily diet (Plat. *Rep.* 2.372C), acquired by gathering (Aristoph. *Nub.* 188–189).

Squills and *bolboi* are associated with each other again at B42.1–2 [*89.15–16*], and likewise elsewhere (e.g. Thphr. *HP* 7.4.12, 7.12.1; [Aristot.] *Probl.* 926a6 & 19–20; *Geop.* 5.8.7, and cf. the contiguous 12.36–37). Here they are either twin or alternative ingredients of recipes now to be presented.

B31.3–4 [*88.27–28*] **φυτεύειν ἐν τῇ πόλει καὶ κύκλῳ περὶ τὸ τεῖχος** ('to plant (them) in the city and round the circuit of the wall'). Though ἐν τῇ πόλει here might conceivably mean 'on the akropolis', which B48 [*89.38–46*] will suggest for use as a communal fruit- and vegetable-garden, I have followed Diels-Schramm 46 and Garlan 303 in understanding it in a more general (indeed, vague) sense.

As to κύκλῳ περὶ τὸ τεῖχος, it would have been helpful if Ph. had specified inside or outside the wall. The former is the more likely, if the availability of these crops was not to be jeopardized during siege conditions. Ph.'s advocacy of a gener-

ous, sixty-cubit internal gap between the wall and houses (A10 under **Ἀπεχέτω**) offered some guarantee that horticulture would not impede the other purposes it was intended to serve.

B31.5 [*88.29*] **τοῦ Ἐπιμενιδείου φαρμάκου** ('the (?)Epimenideian potion'). The manuscripts here have ἐπιμο…δίου, and Schoene printed the conservative ἐπιμο<νι>δίου, i.e. long-lasting. But Diels-Schramm 46 champion the emendation to Ἐπιμενιδείου made by Barocius (Francesco Barozzi) in his Latin translation of the tenth-century-CE siegecraft manual then attributed to "Heron of Byzantium" (Venice 1572), nowadays cited as the anonymous *Parangelmata Poliorketika*. The passage, containing this phrase in the plural, is 203.3 (3.44–45 Sullivan) there. (See **Appendix 3** passage no.1.) The emendation – which is noted in LSJ s.v. Ἐπιμενίδειος – is likewise adopted by Garlan 303, with discussion at 372 n.31*c*: '[l]e Crétois Épiménide était réputé pour sa sobriété: il aurait vécu sans prendre de nourriture, ou du moins en n'usant que par quantités infimes d'un aliment miraculeux'. On the archaic-era Cretan sage, ascetic and (allegedly) poet Epimenides see generally M.L. West, *The Orphic Poems* (Oxford 1983) 45–53, and Dalby, *Food* 134–135 on the attributes of him relevant here. The ancient data include Thphr. *HP* 7.12.1, where a squill – a key ingredient of the concoction in Ph. – is mentioned and seems to be glossed as Epimenidean (τῆς σκίλλης … τῆς Ἐπιμενιδείου καλουμένης) before an alternative undercuts this: 'or it takes its name from its use', ἢ ἀπὸ τῆς χρήσεως ἔχει προσηγορίαν. If, therefore, the recipe in Ph. was named not after its putative inventor or principal consumer but after its (impersonal) function, there is a case for resisting the Barocius emendation, as indeed Sullivan (*Siegecraft* 32–33, with reasoning at 167) does in the *Par.Pol.* passage. Here in Ph. I accept it, with misgivings.

Beyond the preferable reading, here and elsewhere, the substantive point of relevance is Epimenides's reputation for sustaining himself on small portions of a special preparation, without need of conventional food or drink: so e.g. Diog.Laert. 1.114 and esp. a scholion on the phrase 'what great advantage there is in mallow and asphodel' in Hesiod, *Op.* 41 (= Plut. fr.26 Sandbach). Ph., as epitomized, makes no mention of asphodel, but for mallow see B41.1–2 [*89.10–11*], in the context of a recipe not expressly credited to Epimenides.

P.S. Codellas, 'The epimonidion pharmacon of Philon the Byzantine', "the hunger and thirst checking pill" and other emergency foods', *Bull.Hist.Med.* 22 (1948) 630–634, is an article that attracted such popular attention at the time of its publication as to be taken up in *Time* magazine (15 August 1949). Codellas, of the University of California Medical School, gained a working knowledge of Ph. (and the relevant bibliography) with the help of the then doyen of ancient medical studies, Owsei Temkin. After translating the relevant passages, esp. B31–39 [*88.25–89.8*], Codellas ends with a paean of praise: 'From a nutritional and utilitarian point of view the principal ingredients of this emergency food merit respect: honey for its carbohydrate service, protein as supplying the nitrogen need of the body, scilla as a general and cardiac stimulant, and opium as deadening the hunger pains of the stomach. Calorific values are taken care of by the oil and the carbohydrates'. His final comment is that '[i]t will not be too rash to baptise this emergency food the "K" ration [i.e. the U.S. army's daily combat food allowance during World War II] of the ancient Greek peoples'.

B31.5–6 [*88.29–30*] **μηθὲν ἡμῶν πάσχωσιν οἱ πολῖται** ('our citizens may suffer nothing'). Buecheler ap. Schoene tentatively suggested the emendation λιμῷ ('from hunger') as the second word here, but no editor has jettisoned ἡμῶν, despite its odd position in the clause.

On κατὰ τὰς συμβαίνουσας σιτοδείας see B30 under **πρὸς τάς**.

B32.1–2 [*88.31–32*] **Συντίθεται δὲ τὸ λελεγμένον φάρμακον κατὰ τρόπον** ('The potion referred to is duly put together'). On φάρμακον see B1 under **μήκωνας**.

Garlan 303 translates 'La composition du dit remède est la suivante', but that would in my opinion require κατὰ τοῦτον (or τόνδε) τὸν τρόπον – as per the reported readings in the later manuscripts, in fact. One could of course follow them; but if Ph. did write κατὰ τρόπον he seems to have meant something else by it: 'richtig' (Diels-Schramm 46, and cf. generally LSJ s.v. τρόπος, II.4). Contrast, therefore, τοῦτον τὸν τρόπον in B34.2–3 [*88.42–43*].

B32.2–4 [*88.32–33(sic)*] **ἀφεψηθείσης <σκίλλης καὶ πλυθείσης ὕδατι καὶ ξηρανθείσης> κατακοπείσης <τε> ὡς λεπτότατα καὶ κτλ** ('when one has boiled down <squill and rinsed it in water and both dried it and> chopped it up as fine as possible and etc.'). As transmitted in the principal manuscripts of Ph. himself, the recipe has material missing. It has been orthodox since Schoene to supplement it with the words added here, from the eleventh-century *Vaticanus graecus* 1605 (a.k.a. G), the contents of which include the *Parangelmata Poliorketika*. A long marginal scholion there on the adjective ἐπιμονιδίοις (see B31 under **τοῦ Ἐπιμενιδείου**) quotes a version, fuller at certain points and briefer at others, of Ph.'s B32–40 [*88.31–89.10*]; text and translation in Sullivan, *Siegecraft* 32–34.

After what B31 [*88.25–31*] has said about growing and storing 'squills and *bolboi*' in a context described as κατασκευαζομένου τοῦ Ἐπιμενιδείου φαρμάκου, it is somewhat surprising to find only the first of those ingredients mentioned now. An explanation might be that B31, framed too precisely, refers to all the concoctions proffered in these chapters, one of which does mention *bolboi* (B42.1–2 [*89.15–16*]) – yet even there the actual phrase used is 'a squill boiled down and prepared in the same way as a *bolbos*'. As matters stand, no recipe calls for *bolboi* in their own right.

B32.5–6 [*88.34–35*] **σησάμου μὲν τοῦ πέμπτου μέρους, μήκωνος ὡς πεντεκαιδεκάτου** ('a fifth part of sesame and around a fifteenth of poppy'). Both of these ingredients have been included amongst the ἄσηπτα recommended for storage in B1: see under **σήσαμον** and **μήκωνας** there. Here the quantities of them required, evidently, are not absolute but relative to the volume of squill so far prepared.

A fifteenth part looks odd to modern eyes, but can be paralleled in a medicine mentioned by Galen, *de comp.med.* 12.608.6–8, which specifies 'a twelfth or fifteenth part' of *glaukion* (juice of the *Glaucium corniculatum* or horned poppy).

B32.8 [*88.37*] **ὡς βελτίστῳ μέλιτι φυράσαντα** ('mix with best-quality honey'). Although honey (on which see generally Dalby, *Food* 179–180) had not been listed amongst B1's ἄσηπτα, Ph.'s recipes now make much use of it: see also B35.1–2 [*88.43–44*], B41.3–4 [*89.12–13*], B42.6 [*89.20*], B46.3 [*89.33*]; and cf. C72.5 [*96.19*] in a medical context.

In the present instance 'best-quality' might sound like an empty flourish, of the kind often adopted in present-day culinary prose (and in Ph. himself exemplified, perhaps, by the 'best vinegar' of B54.3 [*90.26*]), but compare generally Diosc. *de mat.med.* 2.101–103, and esp. Diophanes in *Geop.* 15.7.1–7: several 'best' (ἄριστον) honeys are geographically identified (with Attic Hymettan best of all, here as elsewhere), and 'inferior' (χεῖρον) honey is recommended for cooking. (The equivalent dichotomy in Athen. *Deipn.* 15.689B is χρῆστον vs. χεῖρον.)

For wax, a byproduct of beekeeping, see C72.4 [*96.18*].

B32.8–9 [*88.37–38*] **διελεῖν ὅσον εἰς ἐλαίας τὰς μεγίστας γινομένας** ('divide into (balls) the size of the largest olives'). Quantities expressed in these sort of terms can be found in the specification of dosages in ancient medical texts: so for instance in Gal. *de antidotis*, using phrases such as 'the size of an olive' (ἐλαίας τὸ μέγεθος: 14.184.8) and 'half an olive (in size)' (ἐλαίας τὸ ἥμισυ: 14.184.10). (I have not seen J. Berendes, *Die Pharmazie bei den alten Kulturvölkern* I (Halle 1891) 243, cited by Garlan 372 n.32*a*.)

The same dosage size is expressed more simply in B39.2 [*89.6*], q.v. below.

B33.1–3 [*88.38–40*] **τούτων ἓν μὲν περὶ δευτέραν ὥραν, ἓν δὲ περὶ δεκάτην ἀναλίσκων τις οὐθὲν ἀπὸ λιμοῦ πάθοι ἂν δεινόν** ('anyone taking one of these around the second hour (of daylight) and one around the tenth should suffer nothing terrible from hunger'). Diels-Schramm 46 give absolute equivalents for these two times, 'früh 7 Uhr' and 'nachm. 3 Uhr'. In fact, since the lengths of ancient "hours" varied, in accordance with both season and latitude (E.J. Bickerman, *The Chronology of the Ancient World* (revised edn. London 1980) 15), such absolute precision is inappropriate; nevertheless Ph.'s own point is clear enough.

The same two dosage times are expressed more loosely in B39.2–4 [*89.6–8*], q.v. below.

B34.1–3 [*88.41–43*] **Ἔστι δὲ καὶ ἄλλο παραπλήσιόν τι τούτῳ φάρμακον, ὃ δεῖ συντιθέναι τοῦτον τὸν τρόπον** ('There is another potion somewhat similar to this, which it is necessary to put together in the following way'). The scholion in *Vaticanus graecus* 1605 – see B32 under **ἀφεψηθείσης** – has a slightly different, briefer version of this: Ἄλλη σύνθεσις φαρμάκου συντιθεμένη τοῦτον τὸν τρόπον.

B35.1 [*88.43*] **σησάμου Ἀττικὸν ἡμίεκτον** ('an Attic half-hekteus (4.377 l.) of sesame'). On sesame see B1 under **σήσαμον** (and B32 under **σησάμου**). In the present recipe, the required quantity of it and of three other ingredients (lemmata below) – by volume, not weight: see under Measures, Weights, Volumes, section 3 – are laid down in absolute terms; contrast B32.5–6 [*88.34–35*] with Comm. The explanation for the different approach this time comes in B37.1–2 [*88.50–51*],

ÉCOLE FRANÇAISE BIBLIOTHÈQUE D'ATHÈNES

where the squill that has been prepared in B36 [*88.47–50*] appears to be added in a volume equal to the honey: see the Comm. thereto.

For the (*sc.*) Attic half-hekteus cf. e.g. [Demosth.] 34.37, an allusion to hungry Athenians in the early 320s having their barley-meal measured out in this quantity, καθ' ἡμίεκτον μετρούμενοι.

B35.1–2 [*88.43–44*] **μέλιτος ἡμίχουν** ('a half-chous (1.642 l.) of honey'). On honey see B32 under **ὡς βελτίστῳ**. As regards its quantity here, the likelihood must be that Ph. is following a recipe in which it, the oil and the almonds are ingredients with the same (Attic) values as the sesame.

For the (*sc.*) Attic half-chous cf. e.g. ?Aristot. *Ath.Pol.* 69.2 (litigants' speeches in penalty-assessments allegedly limited to this much water in the klepsydra); and for the same measure elsewhere Syll.^{3} 1027.14–15 (οἴνου τρία | ἡμίχοα in a Koan *lex sacra*).

B35.2 [*88.44*] **ἐλαίου κοτύλην** ('a kotyle (0.274 l.) of oil'). At B32.8–9 [*88.37–38*] (q.v. above) an *elaia* signified the fruit of the olive-tree. Now and from now on Ph. refers to *elaion* (as he had also done in *Bel.* 61.38). Does this mean olive-oil? In B53.6 [*90.19*] it does not, because fish oil (ἰχθυηρὸν ἔλαιον) is specified. By Ph.'s time etymological and substantive links between ἔλαιον and the olive (tree and fruit alike) had been severed, as LSJ s.v. documents, and it would not be safe to understand the unqualified noun here and in four other passages (B37.3 [*89.1*], B47.2–3 [*89.36–37*], B52.4 [*90.11*], and D80.5 [*102.44*]) as anything other than generic. (Compare also the mention of 'oil', without further qualification, in household accounts on papyri such as PTeb 112.)

For kotylai see again at B42.5–6 [*89.19–20*], of wine.

B35.2–3 [*88.44–45*] **χοινίκα ἀμυγδάλων γλυκέων λελεπισμένων** ('a choinix (1.094 l.) of peeled sweet almonds'). There is a useful collection of sources, with discussion, on the choinix in L. Foxhall and H.A. Forbes, 'Σιτομετρεία', *Chiron* 12 (1982) 41–90, at 51–62.

On almonds see e.g. Hipp. *de diaeta i–iv* 2.55.24–28, Diosc. *de mat.med.* 1.123.1–2, the dossier of sources and information in Athen. *Deipn.* 2.52A-54D, and generally Dalby, *Food* 6: 'kernel of the fruit of *Prunus dulcis*. The fruit resembles a meagre peach, but is inedible. The kernel is used, sliced or ground, in cooking. Some trees produce bitter almonds [see e.g. Xen. *Anab.* 4.4.13]; these have to be roasted before eating to eliminate their poisonous prussic acid'. Ph.'s recipe calls for 'sweet' almonds (again B35.4 [*88.46*] and B38.2 [*89.3*]), as we see. (Africanus in *Geop.* 10.59.1–3 has several tricks for making bitter almond trees produce sweet fruit.)

Ph.'s verb λεπίζειν (and its compound περιλεπίζειν: see the next lemma), as noted in LSJ s.v., is the one cognate not with λεπίς, as in Plb. 10.27.11 and 22.4.7 on stripping off metal plates, but with λέπος, rind or skin. See further under the next lemma.

B36.1–2 [*88.47–48*] **τὰς σκίλλας περιλεπίσαντα** ('thoroughly peel the squills'). I have differentiated in translation between compound περιλεπίζειν here and λεπίζειν

in the preceding clause (see lemma above), though a substantive difference may not be intended. In any event both verbs are very prominent in medical vocabulary, when it relates to preparing the ingredients of drugs and potions. So too is much else in this section. Besides διαμίσγων, noted already at B27 under **τὴν κόνυζαν**, see e.g.: εἰς θυίαν ἐμβαλόντα in B36.3 [*88.49*], παρεμβαλόντα in B38.2 [*89.3*] (with Comm. thereto), ξύλῳ διακινεῖν in B38.3 [*89.4*], μέλιτι ἐφθῷ in B41.3–4 [*89.12–13*], and ἐγκρυφθεῖσα in B42.3 [*89.17*]. Note also B42 under **καὶ σύν** and **ἐν αὐτῷ**, B44 under **Γίνεται**, B45 under **εἰς παλαθίδια**, B46 under **τὰ κρέα**. All this is what might be classified as implicit medical content in Ph.; additionally, of course, some is quite overt (see B43 under **κάθαρσιν**, B47 under **τροφήν**).

B37.1–2 [*88.50–51*] **τῶν τετριμμένων σκιλλῶν <ἴσον> τῷ μέλιτι τρῖψαι ὁμαλῶς** ('crush the crushed squills smoothly with <an equal amount of> the honey'). The standard supplement ἴσον comes, again, from the scholiast's text in *Vaticanus graecus* 1605 (see B32 under **ἀφεψηθείσης**), and the sense of the recipe is materially improved by it; see B35 under **σησάμου**. Its position in the sentence, i.e. relating solely to the honey, is distorted in the translation of Diels-Schramm 47 ('mit dem Honig und dem Öl gleichmassig <zu gleichen Teilen>').

B37.3 [*89.1*] **ἐγχέαντας εἰς χύτραν ἕψειν** ('pour into a pot … and boil'). Cf. [Aristot.] *de coloribus* 795b13–14, ταύτην ἐγχέαντες ἕψωσιν ἐν ταῖς χύτραις. For ἐγχεῖν, already in *Bel.* 70.7 (of smelting), see also B46.3–4 [*89.33–34*], B54.3 [*90.26*], B56.3 [*90.36*], D80.5 [*102.44*]. For a χύτρα see again at B47.2 [*89.36*].

B38.2 [*89.3*] **παρεμβαλόντα τοῦ σησάμου καὶ τῶν ἀμυγδάλων** ('add in the sesame and the almonds'). For παρεμβάλλειν used of adding ingredients in medicine see LSJ s.v., I.e.

The genitives here come as a surprise, but they can hardly be partitive unless another stage of the procedure has been lost in epitomization.

B39.2–4 [*89.6–8*] **διελεῖν ὅσον εἰς ψωμοὺς μικροὺς, καὶ ἕνα πρωί, ἕνα δείλης ἀναλίσκων ἄν τις ἱκανὴν ἔχοι τροφήν** ('divide it into small morsels, and anyone taking one in the morning and one in the evening should get adequate nourishment'). See B32 under **διελεῖν** and B33 under **τούτων**.

B40.1–3 [*89.8–10*] **Τυγχάνει δὲ καὶ πρὸς τὰς στρατιὰς ἱκανὸν τοῦτο <τὸ> φάρμακον· ἡδὺ γάρ ἐστι καὶ πλήσμιον καὶ δίψαν οὐκ ἐμποιεῖ** ('This potion can be adequate for campaigns too; for it is sweet and filling and does not produce thirst'). The scholion in *Vaticanus graecus* 1605 (see B32 under **ἀφεψηθείσης**) supplies the τό. (By a slip, I take it, Garlan's apparatus mis-reports τε there.)

The second part of the sentence is echoed in *Par.Pol.* 203.4 (3.46): see **Appendix 3** passage no.1.

B41.1–2 [*89.10–11*] **Συντίθεται δὲ βρῶμα καὶ ἐκ τοῦ τῆς μολόχης καὶ ἐκ τοῦ τῆς σκίλλης καρποῦ** ('A foodstuff is also put together out of the (fruit) of the mallow and out of the fruit of the squill'). A βρῶμα is typically an individual, specific foodstuff, as e.g. in Thuc. 4.26.5: the Spartan troops stranded on Sphakteria island in 425 need 'ground grain and wine and cheese and any other βρῶμα that would be useful in a siege'. By contrast Ph. here, just the once, uses it as a variant of his normal φάρμακον (on which see B1 under **μήκωνας**).

On mallow (*Malva sylvestris*) as an appetite-suppressant see already B31 under **τοῦ Ἐπιμενιδείου**, and further in Dalby, *Food* 206. Athen. *Deipn.* 2.58D-F has a more general dossier of quotations and other information, and see also e.g. Aristoph. *Plut.* 543–544 (one of the marks of poverty is 'to eat shoots of mallow instead of bread'), Diosc. *de mat.med.* 2.118.1–2, and Damegeron in *Geop.* 12.12.

B41.4–5 [*89.13–14*] **τῶν ἴσων ψωμῶν τοῖς εἰρημένοις διδομένων** ('when given in morsels of the size stated'). At B39.2 [*89.6*] most immediately, but see also B32.8–9 [*88.37–38*].

B42.3 [*89.17*] **ἐγκρυφθεῖσα** ('hidden (under the ashes'). This everyday application of the verb ἐγκρύπτειν can claim literary antecedents in an Homeric simile (*Odyssey* 5.488–490, inc. σποδιῇ ἐνέκρυψε μελαίνῃ); and again – cf. B36 under **τὰς σκίλλας** – the term is common in medical vocabulary. There was an ash-baked loaf called an ἐγκρυφίας (Athen. *Deipn.* 3.110B). For less palatable foods cooked in this way, like the one here in Ph., see e.g. Diod.Sic. 1.80.5 (= Hecataeus of Abdera FGrH 264 F25.80.5) on Egyptian children being fed suitable parts of the papyrus plant, τῶν ἐκ τῆς βύβλου πυθμένων τοὺς δυναμένους εἰς τὸ πῦρ ἐγκρύβεσθαι; cf. Crawford, *Kerkeosiris* 131 (and more generally Thompson, *Memphis* 245).

B42.3–4 [*89.17–18*] **εἶτα <…> περιληφθεῖσα** ('then wrapped up <…>'). Schoene found no fault with the paradosis here, but Diels-Schramm 48 (apparatus) declared εἶτα περιληφθεῖσα either corrupt or lacunose, and suggested <ἀλφίτοις> περιληφθεῖσα, 'wrapped up <in barley-meal>'. Garlan 304, while accepting the lacuna, is no more confident that this is the correct way to fill it. The fact that Ph. has not previously mentioned ἄλφιτα cannot be a decisive point against its appearance here; even so, plausible alternatives might include some of the ἄσηπτα of B1 (parched barley, sesame-seeds, poppy-seeds).

B42.4 [*89.18*] **καὶ σὺν τῷ ὀροβίνῳ ἀλεύρῳ ἐν τῷ αὐτῷ κοπεῖσα** ('also, chopped with bitter-vetch meal in the same (mortar)'). The translation adopted by Garlan 304 seems to indicate that in his opinion this clause continues the recipe begun at B42.1 [*89.15*], Ἐσθίεται κτλ. I consider that Diels-Schramm 48 are right – as indicated by their punctuation as well as their translation – to see B42.4 beginning the new one that, from the method(s) employed, it surely sounds like. This makes ἐσθίεται and πίνεται (the next word here) describe, respectively, a solid and a liquid way of ingesting squill.

On bitter-vetch (*orobos*) itself see under B1 **ὀρόβους**. Bitter-vetch flour or meal, as here, is an ingredient of very common resort in the medical writers, and cf. also e.g. *Geop.* 7.37.2, 8.24.1.

B42.5–6 [*89.19–20*] **πίνεται ἐν οἴνῳ κεκραμένῳ ὅσον τρισὶ κοτύλαις καὶ μέλιτι** ('it is drunk in mixed wine – three kotylai (0.822 l.) – and honey'). For kotylai see already B35.2 [88.44].

Though the word order here is somewhat awkward, and in other contexts *oinos kekramenos* is wine diluted with water (so explicitly e.g. Diod.Sic. 4.3.4, Athen. *Deipn.* 4.153B, *Geop.* 4.15.19), Ph.'s mix, resulting in a thick fluid – see next lemma – is presumably a wine-and-honey one.

B42.6–7 [*89.20–21*] **ἐν αὐτῷ τῷ οἴνῳ διατηχθεῖσα οὕτως, ὥστε γίνεσθαι τὸ πάχυς ὡς κυκεῶνα** ('after it has been softened in the wine itself in such a way as to produce a posset-like thickness'). The verb διατήκειν will recur in B46.2–3 [*89.32–33*], of meat: τὰ κρέα σφοδρῶς ἑψηθέντα καὶ διατακέντα. Elsewhere, again, it is particularly common in (though by no means restricted to) medical writings.

On posset (κυκεών), with its Homeric antecedents, see generally LSJ s.v.; Braun, 'Food' 24; Dalby, *Food* 190–191.

B43.2–3 [*89.23–24*] **κάθαρσιν διὰ τῶν οὔρων οὐκ ἄτοπον ἀπεργάζεται** ('brings about a natural evacuation through urinating'). Amid all the medical vocabulary and phraseology called upon to express what the modern reader, at least, would categorize as culinary processes (see B36 under **τὰς σκίλλας**), Ph. here appends to the nutritional merits of the concoction – τροφὴν ἱκανὴν παρέχει – an overtly iatric claim. (He does this again at B47.3–4 [*89.37–38*], q.v. below.) For *katharsis* in this sense see generally LSJ s.v., II: '*clearing off of morbid humours,* etc., *evacuation,* whether natural or by the use of medicines'. In medical writers urine (for which see already B28 under **κἂν οὔρῳ**) is characteristically in the plural, as here, and several of the Christian-era ones – Galen, Oribasius, Aetius, Alexander, Paulus, Stephanus – mention *katharsis* δι' οὔρων.

Whether Ph. (or his source) regarded any particular ingredient(s) of this drink as actively diuretic is not clear. The authors represented in the *Geoponica* make that claim for several items – see 8.3.1, 8.16.1, 12.19.8, 12.30.1 & 5, 12.32.1, 12.35.1 – but for none of the ones in Ph.'s recipe. Present-day nutritionists would classify as diuretics all four of the ingredients that the drink contains (squill, vetch, wine, honey); and for ancient appreciation of squill in that regard cf. Pliny, *HN* 20.100.

B44.1–2 [*89.24–25*] **Γίνεται δὲ καὶ ἐξ αὐτῆς ἀρτὸς τρὶς ἀφεψηθείσης <καὶ τριβείσης> λείας** ('Bread is also made out of it: boiled down three times <and crushed> smooth'). 'It', grammatically feminine, must still be the squill of B42.1–2 [*89.15–16*], described there as ἀφεψηθεῖσα. (Extra confirmation of that, were it needed, comes in the repetition of ἀφεψηθείσης <σκίλλης from B32.2 [*88.32*].)

The verb ἀφέψειν – first attested in Herodotus's account of how Egyptians produce oil from *kiki*, the fruit of the castor-oil plant (Hdt. 2.94.2; cf. Thompson, *Memphis* 43), probably even better known as the descriptor of the figuratively boiled-down Demos in Aristophanes' *Knights* (1321, 1336), and still found, post-Ph., in (e.g.) Plb. 34.10.12 and Strab. 4.6.12 – is yet another choice item of medical vocabulary.

The supplement <καὶ τριβείσης> (or <καὶ τριφθείσης>) was tentatively proposed by Brinkmann ap. Schoene. It was not adopted by Schoene himself, who must have deemed ἀφεψηθείσης λείας a complete and acceptable phrase as transmitted, but his successors have printed it.

B44.2–3 [*89.25–26*] **μιχθείσης τρίτῳ μέρει σταιτός** ('mixed with a third part of (?)emmer-dough'). The paradosis of this phrase ends with the corrupt and untranslatable σπαστο. Some attempts to conjure sense out of it are summarized in the apparatus in Schoene ad loc., and he himself (followed by both Diels-Schramm 48 and Garlan 305) printed the least unsatisfactory of them: Buecheler's emendation to σταιτός. But what does it mean? Translations of the phrase here – 'mit ⅓ Weizenmehl vermischt wird' (Diels-Schramm); 'en la mélangeant à un tiers de pâte de froment' (Garlan) – presume that the ingredient in question here is a cereal or cereal-product. LSJ s.v. I defines it as 'flour of spelt mixed and made into dough'; or else, later and more rarely, dough in general. According to Dalby, *Food* 131 and 309, '[i]n English translations of classical texts 'spelt' is often written instead of emmer', but he does not register the word *stais* under either cereal, and in any case one might have expected Ph. to say *zeia* or *olyra*. On the emmer/spelt issue see also e.g. Sallares, *Ecology* 349–350, 357.

The possibility that Ph.'s *stais* (if that is indeed the word he wrote) is an instance of LSJ s.v. II – σταίς as a (quite rare) synonym of στέαρ – might arise if C.B. Gulick in his Loeb edition were right to translate the σταιτίτης bread (or pancake) in Athen. *Deipn.* 3.110B-C as 'suet-bread'. At 14.646B & E, however, Gulick understands (ἐκ/διὰ) σταιτός as 'spelt-dough', in recipes where a cereal is certainly needed; and in the present context a proportion of one-third suet would not be credible. (Gulick's successor, S.D. Olson, tacitly eliminates the discrepancy by translating 'spelt bread' in 110 and 'spelt-dough flour' in 646.)

B45.1 [*89.27*] **τὰ σῦκα** ('figs'). Ph.'s sole mention of figs (apparently in their fresh state: σῦκα as opposed to ἰσχάδες), but cf. fig-trees, συκέαι, at B48.4–6 [*89.41–43*].

See generally e.g. Hipp. *de diaeta i–iv* 2.55.2–24; Diosc. *de mat.med.* 1.128.1–3; the dossier of sources and information in Athen. *Deipn.* 3.74C-80E; Braun, 'Food' 51–52; Dalby, *Food* 143–144.

B45.1–2 [*89.27–28*] **μετὰ τῶν γιγάρτων καὶ τῆς σταφίδος κοπέντα** ('chopped with pomace and (?)raisin'). Where it relates to grapes rather than olives, LSJ s.v. translate γίγαρτον as the grape's 'stone', but more exactly the term embraces the skins, pulp and stems as well as the pips of crushed grapes. Those European languages that are spoken in long-established wine-producing zones have the vocabulary to convey this very easily: thus, here, 'mit Weintrestern' (Diels-Schramm 48) or 'avec du marc' (Garlan 305). In English a one-word equivalent has to call on less familiar vocabulary.

As to the other word in Ph.'s phrase here, σταφίς can sometimes (LSJ s.v. II) designate *Delphinium staphisagria*, a.k.a. stavesacre – yet all parts of that plant are toxic (and, as such, are recommended by ancient writers for killing lice and other parasites: so e.g. in *Geoponica* 13.14.5, 13.15.7, 14.17.3). Accordingly, its sense

here is surely that of σταφίς as an occasional variant (cf. e.g. Septuagint *Num.* 6.3) of ἀσταφίς, the collective noun for grapes in their dried form as raisins vel sim.

B45.2–3 [*89.28–29*] **εἰς παλαθίδια διαμερισθέντα καὶ μαράθῳ διαχρισθέντα** ('divided into little cakes and coated all over with (oil of?) fennel'). The paradosis here has εἰς παλαθίδα, i.e. accusative singular of the feminine noun παλαθίς, a variant (also in Strab. 2.3.4) of παλάθη, and it is registered as such by Arnim, *Index* 59 and in LSJ. Schoene's apparatus, however, notes two suggested emendations, his own to εἰς παλαθίδας and Buecheler's to the (otherwise unattested) diminutive παλαθίδια. Both Diels-Schramm 48 and (tacitly) Garlan 305 adopt the latter.

On fennel (*marathon*: *Foeniculum vulgare* – though not, in antiquity, the finocchio or Florence fennel with the swollen bulb familiar nowadays) see e.g. Diosc. *de mat.med.* 3.70.1–2, and generally Dalby, *Food* 142. This is its only appearance in Ph. The participle διαχρισθέντα – more medically-coloured vocabulary – appears to imply (as that verb and its cognate noun often do elsewhere) a process of all-over smearing with something viscous or even fluid; but since the phrase 'coated all over with fennel' does not readily create a picture of which untreated part of the plant, leaves or seeds or stems, is to be used, Ph. may well be referring to oil of fennel. (Compare B47.2–3 [*89.36–37*], ἐν χύτρᾳ καινῇ ἐλαίῳ χρισθείσῃ.)

B46.2–3 [*89.32–33*] **τὰ κρέα σφοδρῶς ἑψηθέντα καὶ διατακέντα καὶ βουτύρῳ καὶ μέλιτι μιχθέντα** ('meats which have been thoroughly boiled and softened and mixed with butter and honey'). For διατακέντα see B42 under **ἐν αὐτῷ**.

Broadly speaking the procedure described in this sentence as a whole will be familiar to modern readers as that of "potting" food, here meat, by preserving it in its own cooking juices. Nowadays, very often, a layer of melted butter allowed to set hard over the top will contribute to the process. Ph. makes no mention of that but does, as we see, stipulate that both butter and honey form part of the mixture itself.

While the use of honey in this context need occasion no surprise (see generally B32 under **ὡς βελτίστῳ**), the appearance alongside it of butter – here only, in Ph., and by an odd mischance omitted from Arnim's *Index* – does call for comment. It has been a truism in writings on the Mediterranean diet that the Greeks themselves were not eaters of butter (Braun, 'Food' 48 has an extreme formulation of this), which in consequence was one of the things they associated with uncouth northern barbarians: 'butter-eating men, dirty-haired' (Anaxandrides fr.42 K.-A). Prejudice aside, it might therefore be that Ph.'s recipe here is another aspect of his recommendations (cf. B1 under **ἱππάκην**) which shows "Skythian" influences. But note as a serious alternative Dalby, *Food* 65: '[i]n translations of ancient Near Eastern texts 'butter' should generally be understood as 'ghee' – butter which has been heated and allowed to solidify, after which it keeps well and can be re-melted for use in cooking. […] When *boutyron* is mentioned by Strabo [16.4.24, 17.2.2] as a commodity of Arabia and Sudan, and is described in the *Periplous* as a typical article of trade in the Indian Ocean [*Periplous Maris Erythraei* 14], ghee is certainly what these authors mean'.

The Hippocratic corpus and other medical writings contain plenty of preparations that involve mixtures of 'butter' and honey (see e.g. Diosc. *de mat.med.* 2.72.1–2); cf. also the multi-item remedy for a coughing horse in *Geop.* 16.11.2 (Hierocles).

B46.3–5 [*89.33–35*] **ἐγχυθεὶς πᾶς ὁ ἐξ αὐτῶν γινόμενος ζωμὸς εἰς ἀγγεῖα καθαρά** ('any broth which comes out of them, poured into clean jars'). Besides being an everyday foodstuff, 'broth' (ζωμός) is frequently mentioned in medical writings, often with specification of the ingredient(s) out of which it has been made. So e.g. Hipp. *de diaeta i–iv* 3.75.8 (ζωμὸν ὑείων κρεῶν), *de morbis i–iii* 3.12.9 (ζωμὸν ὀρνιθείων πίονα θερμόν); Diosc. *de mat.med.* 2.6.1.5–6 (ὁ ἐκ τῶν χημῶν καὶ ἐκ τῶν ἄλλων κογχαρίων ζωμός), 5.11.3.5–6 (ζωμὸν ὄρνιθος ἢ ἰχθύων).

For 'clean jars' cf. *Geop.* 9.19.8 (Apuleius) on making what nowadays would be called extra-virgin olive oil from unripe olives: τὸ γὰρ ἐξ ἐλαφρᾶς θλίψεως πρόρυμον ἥδιστον καὶ λεπτότατόν ἐστι, ὃ εἰς ἀγγεῖα καθαρὰ μεταντλήσας, ἰδίᾳ εἶναι πρόσταξον.

B47.1 [*89.35*] **αἰγίλωψ** ('goat-grass'). The noun αἰγίλωψ is applied by Theophrastus (*CP* 5.15.5, *HP* 3.8.2) and other Greek authors to two unrelated botanical species, LSJ s.v. nos. I (*Aigilops ovata*) and II (*Quercus cerris*). Here, it is agreed, Ph. means the first (also registered in Diosc. *de mat.med.* 4.137.1): 'Windhafer' (Diels-Schramm 48), 'l'avoine sauvage' (Garlan 305); in English, goat-grass or haver-grass. In *Geop.* 2.43.1 (Paxamus) and elsewhere its presence is regarded as detrimental to more conventional cereals, but medical writers recognized its discutient properties and prescribed it in treatments for ophthalmic conditions (cf. Hesychius α 1717), swellings and other ailments. See further under the next lemma.

B47.3–4 [*89.37–38*] **τροφήν τε γὰρ παρέχει καὶ δυσεντερίαν ἰᾶται** ('for it provides nourishment and also cures dysentery'). A second instance of Ph. appending an iatric merit to a more broadly nutritional one; cf. B43 under **κάθαρσιν**. For dysentery in armies and other military contexts cf. e.g. Hdt. 8.115.3 (λοιμός τε … καὶ δυσεντερίη afflicts Xerxes's retreating troops in autumn 480); Plat. *Theaet.* 142B; Plb. 32.15.14; Diod.Sic. 14.71.2, 31.35.1; Nutton, *Medicine* 25.

To combat δυσεντερία (a term in general, layman's use since the classical period – witness Herodotus and Plato, as cited – as well as in the specialist literature) medical writings advocate an extraordinarily wide range of substances, whether alone or in combination. General references, however, to *aigilops* and its uses do not, as far as I am aware, highlight any supposed efficacy against dysentery or allied gastrointestinal complaints.

B48 [89.38–46]: gardens

B48.1–3 [*89.38–40*] **Συμφέρει δὲ κηπία ἐν ταῖς ἰδίαις οἰκίαις καὶ ἐν ταῖς ἀκροπόλεσιν καὶ ἔν τε τοῖς <ἄλσεσι καὶ> τεμένεσι τῶν θεῶν κατασκευάζειν** ('It is also advantageous to establish gardens in private houses and in citadels and also in the <groves and> precincts of the gods'). The τε before τοῖς shows that one of a pair of nouns is missing here. Schoene diagnosed a lacuna but made no suggestions for filling it. The attractive supplement <ἄλσεσι καί> is Diels's, printed in Diels-

Schramm 48 and accepted by Garlan 305. With or without it, this is Ph.'s only explicit mention of the presence of 'the gods' in the cities he is catering for. (Nor are there many implicit ones, either; see merely D2–4 [*96.28–37*] on the wisdom of attacking a city while a festival is distracting the inhabitants.)

For horticulture in a *temenos* cf. e.g. Plb. 18.6.4: Philip V ironically promises to send 'plants and gardeners to tend to the [Nikephorion and the *temenos* of Aphrodite at Pergamum: see 16.1.5–6] and to augment the trees that were cut down' (φυτὰ δὲ καὶ κηπουροὺς πέμψω τοὺς φροντιοῦντας θεραπείας τοῦ τόπου καὶ τῆς αὐξήσεως τῶν ἐκκοπέντων δένδρων).

Ph.'s views about what could or should be done, by way of food provision, in private households have already been aired at B1.2 [*86.22*] and B31.2–3 [*88.26–27*], and cf. also the more directly military planning outlined in C23–25 [*92.40–93.1*] and C45 [*94.20–24*]. For 'citadels', *akropoleis* (Lawrence 130–136), see again at D71.2 [*102.4*]; and for gardens therein cf. Diod.Sic. 20.102.4 on Sikyon in the late fourth century, where 'the enclosure of the akropolis, level and large, is surrounded on all sides by cliffs difficult to climb, so that nowhere can machines be deployed; it also has an abundance of water, which allowed them to establish rich gardens, etc.' (Ὁ γὰρ τῆς ἀκροπόλεως περίβολος ἐπίπεδος ὢν καὶ μέγας κρημνοῖς δυσπροσίτοις περιέχεται πανταχόθεν, ὥστε μηδαμῇ δύνασθαι μηχανὰς προσάγειν· ἔχει δὲ καὶ πλῆθος ὑδάτων, ἐξ οὗ κηπείας δαψιλεῖς κατεσκεύασαν κτλ). However, these Demetrian gardens at Sikyon, it is implied there, were intended more to please the king than to feed the populace. The latter scenario is, by contrast, in play in the text cited by Garlan 373 n.48*a*, Plut. *Philop.* 13.2 on Megalopolis in the early second century, though the expedient of 'planting the lanes' (σπείρειν τοὺς στενωπούς) was apparently an unwelcome emergency response to a particular crisis, not a pre-emptive policy. For both considerations together (*utilitatis ac voluptatis ratio*), in this context, see Veget. 4.7.

Some of the fruits and vegetables that Ph. envisages as being grown in these public and private gardens are named in the remainder of B48: see under the lemmata below. The authors represented in *Geoponica* book 12 bring together a larger range of possibilities. (See esp. the unattributed 12.1.1–12, 'What is sown each month, and what is planted, in the latitude of Constantinople', with J. Koder, *Gemüse in Byzanz: Die Versorgung Konstantinopels mit Frischgemüse im Lichte der Geoponika* (Vienna 1993).)

B48.3–4 [*89.40–41*] **ὑγείας ἕνεκεν καὶ ἐάν τις συμβαίνῃ πολιορκία** ('for health's sake and if any siege occurs'). Ph. will take up the second of these scenarios from B49.1–2 [*89.46–47*] onwards, but it is noteworthy that he mentions here, first, a consideration which will obtain whether the city is under siege or not; that is, a constant. The importance he attaches to good health in the population will reappear in B54 [*90.24–27*] on water-purification, and is indeed implicit in Part B as a whole. For comparable solicitude on the attackers' behalf see D63 [*101.23–25*].

B48.4–6 [*89.41–43*] **φυτευθεισῶν γὰρ συκεῶν καὶ φοινίκων, ἐὰν ἡ πόλις φέρῃ** ('for when figs and – if the city can produce them – dates have been planted'). See generally under B1 **καὶ φοινικικοὺς ἄρτους**. In the present passage I follow Garlan 305 ('si l'on y plante des figuiers, ainsi que des palmiers si la situation de la ville le permet') in taking the proviso-clause to apply only to the date-palms, thus making it a noteworthy hint that Ph. is allowing for their absence. Diels-Schramm 48–49 appears to relate it to both kinds of tree ('Wenn man nämlich Feigen- und Dattelbäume pflanzt, falls überhaupt in der Stadt solche gedeihen'), but for a reasonable parallel note B20.1–2 [*87.37–38*], Ἐὰν δὲ προέλῃ μήτε μονόλιθον εἶναι τὸ ὑπέρθυρον μήτε ξύλινον, μὴ ἐμπρησθῇ; there the conditional clause can only belong with the second of the two items mentioned.

B48.6–7 [*89.43–44*] **σπαρείσης τῆς Ἰνδικῆς καὶ Ἑλληνικῆς κολοκύνθης** ('the Indian and Greek gourd has been sown'). Dalby, *Food* 90 glosses a colocynth (his entry there) as 'wild relative of the water-melon […] The colocynth or bitter apple or bitter cucumber (*Citrullus colocynthis*) is Greek *kolokynte*, *kolokynthis*, *tolype*, Latin *colocynthis*'. This may not help much with the present passage, however, where two geographically-designated types of κολοκύνθη (*sic*) – a noun which it may be best to translate here broadly and generically: gourd, pumpkin, squash – are differentiated. Like Garlan 373 n.48*c*, I can make no headway in assigning botanical identifications to Ph.'s two types, within the family *Cucurbitaceae*.

B48.7 [*89.44*] **ἄρων** ('arums'). On ἄρον see generally LSJ s.v. It is another Greek botanical term which was used of several, unrelated species, but the one Ph. has in mind here is almost certainly *Arum italicum* (a.k.a. Italian or large cuckoo-pint). Its starchy, tuberous roots could be boiled – to eliminate their toxic calcium oxalates – and eaten; so e.g. Diosc. *de mat.med.* 2.167.1.

Dalby, *Food* 28–29, takes this to be the *chara* – a local name, evidently – which Julius Caesar's hungry troops at Dyrrachium in 48 would pick, mix with milk, and 'make into something resembling bread', *ad similitudinem panis efficiebant* (Caes. *BC* 3.48; cf. Polyaen. 8.23–24, ἄρτους … ἐκ βοτάνης, Plut. *Caes.* 39.2–3, App. *BC* 2.61). Not a conventional garden plant, unlike the two about to be mentioned.

B48.7 [*89.44*] **κράμβης καὶ θρίδακος** ('cabbage and lettuce'). On the former see e.g. the dossier of sources and information in Athen. *Deipn.* 9.369E-370F; Diosc. *de mat. med.* 2.120–121; *Geop.* 12.17 (Paxamus); and generally Dalby, *Food* 67. On the latter see e.g. the dossier of sources and information in Athen. *Deipn.* 2.68F-70A; *Geop.* 12.13 (Florentinus) and 12.14 (Didymus); and generally Dalby, *Food* 195–196.

Both together feature in household accounts on papyrus, such as PTeb 112, which give an insight into 'market garden cultivation for home consumption' (Crawford, *Kerkeosiris* 116) in the villages of Ptolemaic Egypt; and the health-giving properties (cf. B48.3–4 [*89.40–41*], ὑγιείας ἕνεκεν) of both were widely recognized.

B49–53 [89.46–90.24]: provision of raw materials, equipment and personnel

B49.1–2 [*89.46–47*] **Δεῖ δὲ παρασκευάζεσθαι πρὸς τὰς πολιορκίας κτλ** ('With a view to sieges it is necessary to provide etc.'). The fruits and vegetables listed in B48 have been recommended on two counts, 'for health's sake and if any siege

occurs' (ὑγιείας ἕνεκεν καὶ ἐάν τις συμβαίνῃ πολιορκία: B48.3–4 [*89.40–41*]; q.v. lemma above). Now the second of them comes to the fore.

In broad-brush terms, an instance of a city's adopting the sort of advance planning Ph. has in mind here is provided by Megalopolis, as it prepared – successfully, in the event – to resist Polyperchon in 318: see Diod.Sic. 18.70–71. As to lists of commodities, more narrowly, a Byzantine-era one closely comparable with Ph.'s – not, *pace* Garlan 373, identical with it – in *De obsidione toleranda* 19 begins with foodstuffs (Εἰ μὲν εἴη χρήματα τοῦ δημοσίου, λαμβάνειν ἐξ αὐτῶν καὶ ἐξωνεῖσθαι μὴ μόνον σῖτον καὶ κριθὴν καὶ οἶνον καὶ ὄσπρια καὶ τυρὸν καὶ κρέας καὶ ἔλαιον καὶ κέγχρον) but then continues with hardware, as here: ἄλλα καὶ σίδηρον καὶ χάλκωμα καὶ ἅρματα καὶ πίσσαν ὑγρὰν καὶ ξηρὰν καὶ θεῖον ἄπυρον καὶ στυπεῖον καὶ λινάριον καὶ κανάβιον, δαῖδας, μαλλόν, βαμβάκιον, λίνα, χόρτον, ἄχυρον. (For the six items underlined see B52 below.) Note also Veget. 4.8 (and 4.9, on a commodity Ph. seems to have ignored: sinews and hair, for torsion artillery). According to Plut. *Cat.Min.* 59.4, Cato's personal register (βιβλίον, ἀναγραφή) of the defensive capacity of Utica in 46 included grain (*sitos*) amidst a list which otherwise focuses on military resources: τῶν πρὸς τὸν πόλεμον ὀργάνων [see below under **βέλη**], ὅπλων [see the next lemma], τόξων [see C25 under **ἀφοριστέον**], and a final item which has been transmitted as ὁπλιτῶν (deleted by Bekker; K. Ziegler in the Teubner edn. substitutes πλοίων).

B49.2 [*89.47*] **ὅπλα** ('arms'). No doubt the term embraces, here as routinely elsewhere, both the offensive weaponry and the defensive armour of individual soldiers; see generally LSJ s.v. ὅπλον, III.1. Again at B55.5 [*90.32*] (on signalling the need for more) and C27 [*93.3–4*] (to be issued by the city, to those unable to provide their own).

In C54.2 [*94.50*] the word is used in a different, larger sense.

B49.2 [*89.47*] **σίδηρον καὶ χαλκόν** ('iron and bronze'). For iron cf. already A8.3 [*80.7*] (with lead, mentioned in the supplementary list here: B52.2 [*90.9*]) and A23.1 [*81.29*], and see also C51.4 [*94.39*], C52.4 [*94.43*] and C53.4–5 [*94.46–47*]; also, from the attackers' perspective, D12.2–3 [*97.35–36*], D17.5 [*98.8*], D34.3 [*99.23*], D46.2 [*100.13*], D55.6 [*100.44*], D74.1–2 [*102.19–20*], D74.5 [*102.23*] and D75.1–2 [*102.23–24*]. See generally J.F. Healy, *Pliny the Elder on Science and Technology* (Oxford 1999) 326–337; M. Kostoglou, *Iron and Steel in Ancient Greece* (Oxford 2008). Bronze, an alloy of copper and tin (Healy, *Pliny* 301–314, at 305–306), is otherwise mentioned by Ph. much more seldom: see merely B55.1 [*90.28*], and as used by the aggressors D34.3 [*99.23*] again, and D77.4 [*102.34*].

For the combination see already *Bel.* 71.42–43 (αἱ …πυρώσεις τόν τε σίδηρον καὶ χαλκὸν μαλακύνουσιν) and elsewhere e.g. Joseph. *AJ* 7.335, App. *BC* 1.117.

B49.2–3 [*89.47–48*] **πλίνθους καὶ λίθους χρησίμους πρὸς τὴν οἰκοδομίαν** ('bricks and stones useful for building'). Unlike some other appended phrases of this and similar types in Ph. (see B48 under **φυτευθεῖσων**) there can be little doubt that πρὸς τὴν οἰκοδομίαν applies to the bricks as well as the stones. On *plinthoi* see generally A7 under **πλινθίνους**.

See further under the next lemma.

B49.4 [*89.49*] **βέλη καὶ πετροβόλους καὶ ὀξυβελεῖς καταπάλτας** ('projectiles and rock-projectors and bolt-firer catapults'). Garlan 305 translates 'd'armes de jet, de pétroboles, de catapultes oxybèles', but given the second and third of these items there seems insufficient scope for the first of them, βέλη, to mean anything other than what the machines will fire. Thus, rather, Diels-Schramm 49 ('Geschosse, Steinwerfer und Pfeilgeschütze') and B. Campbell, Military *Writers* 160 ('ammunition for catapults, stone-throwers, dart-firing catapults').

If in fact Ph. means by these βέλη only what the *oxybeleis katapaltai* will fire, the immediately preceding mention of 'stones useful for building' (see the preceding lemma) might advantageously have been expanded to include ones, of a quite different kind, suitable for firing from *lithoboloi/petroboloi*.

B49.5–6 [*89.50–51*] **μηχανοποιὸν καὶ ἄνδρας, οἳ χρήσιμοι τοῖς ὀργάνοις ἔσονται** ('a mechanic and men who will be of service to the engines'). In A44.3 [*83.9*] Polyidus has been called 'the *mêchanopoios*': artificer, engineer, mechanic; someone who can 'make' *mêchanai* in the sense of designing and building them in the first place and maintaining them thereafter; see generally, on this and related vocabulary, Garlan 207. Ph.'s apparent recommendation here that a city expecting to be besieged should have just one of them on hand (for which model cf. perhaps Xen. *Hell.* 2.4.27 on late-fifth-century Athens, τοῦ μηχανοποιοῦ τοῦ ἐν τῷ ἄστει) is accepted by Garlan 373 n.49*a* ('Le fabricant de machines est un spécialiste hautement qualifié; il en suffisait d'un par ville') but subsequently undercut at D12.4–6 [*97.37–39*], where the enemy is advised to announce honours and rewards for anyone killing 'some of the engineers or those who are noteworthy in respect of artillery'. (The second part of that phrase, τῶν ὄντων ἐπὶ τῶν βελῶν ἀξιολόγων, is an even vaguer equivalent of the present passage's ἄνδρας, οἳ χρήσιμοι τοῖς ὀργάνοις ἔσονται. See also C68.4–5 [*96.5–6*], τῶν χρησομένων αὐτοῖς [*sc.* the artillery and their installations] ἐντέχνων ὄντων. On any formulation, the expertise of these men possibly – though not demonstrably – extended beyond that of the '*katapeltaphetai*' of A32.8–9 [*82.13–14*].)

S. Cuomo, *Technology and Culture in Greek and Roman Antiquity* (Cambridge 2007) 41–76 (= chap.2) is a stimulating study of 'the Hellenistic military revolution' with particular reference to its technicians; their attributes and merits, she argues, bring about a redefinition of traditional martial virtue in terms of technocratic expertise.

B49.6 [*89.51*] **κοφίνους** ('baskets'). The sole use of the word *kophinos* in the treatise. Elsewhere (B51.1 [*90.5*], C33.3 [*93.31*], D47.2–3 [*100.15–16*], and as used by the attackers D51.4 [*100.28*]) Ph.'s term is *phormos*. It is not clear whether he intends a substantive distinction – which in any case scholars have found very difficult to establish: see D.A. Amyx, 'The Attic Stelai, III; vases and other containers', *Hesperia* 27 (1958) 163–307, at 271–273 (κόφινος) and 274–275 (φορμός); White, *Farm Equipment* xii, 72–75, 107. See further below, B51 under **φορμούς**.

For *kophinoi* in advice to defenders cf. Aen Tact. 38.7 (lowering men over the wall in them to collect and recycle stones). In Polyaen. 4.3.3 Alexander the Great, at Tyre in 332, takes the lead in bringing foward a *kophinos* of earth to begin building the siege mole (on which cf. generally Diod.Sic. 17.40.4–5; Arr. *Anab.* 2.18.3–6).

B49.7 [*90.1*] **δικέλλας καὶ ἄμας** ('mattocks and shovels'). For the first of these terms cf. D44.4 [*100.9*] and D56.3 [*100.46*], where they are in the attackers' hands. The *di-* prefix of this noun implies something double, and LSJ s. v. translate it 'two-pronged fork'; however, in context here (and elsewhere) one should envisage, rather, a mattock – so B. Campbell, *Military Writers* 160; cf. Diels-Schramm 49 ('Hacken'), Garlan 305 ('hoyaux à deux pointes') – with an each-way head like that of a pickaxe.

Lawrence 89 renders ἄμας as 'buckets'. That is not out of the question (see LSJ s. v.), but the natural pairing of mattocks and shovels (the latter not mentioned elsewhere in the treatise) is found also in e. g. Aeschines 3.122; Pollux 1.245; Athen. *Deipn.* 13.585A; *Geop.* 2.23.5 (Varro).

B49.7 [*90.1*] **ἁμάξας** ('wagons'). Again – used by the attackers, and in association with mattocks – at D56.3 [*100.46*]; cf. also the ὁδοὺς ἁμαξηλάτους of A78.2 [*85.33*].

Beyond routine uses of wagons for transport, they might also, in appropriate circumstances, serve the defenders as barricades: Aen.Tact. 2.5–6 (cf. Thuc. 2.3.3), 16.15; and cf. 37.9 for a protective screen when tunnelling. (Attackers exploit wagons in 28.5–6.) See also e. g. Apollod.Mech. 139.11 ('wagons bearing weights' are one of the things that can be rolled down onto attackers if the city occupies an elevated position).

B49.7 [*90.1*] **ἀξίνας** ('axes'). Not otherwise mentioned in the treatise. Instances elsewhere of their use for general purposes (as opposed to military combat) include Xen. *Anab.* 1.5.12 and Polyaen. 1.28.2 (wood-cutting); also Xen. *Cyrop.* 6.2.34.

B49.8 [*90.2*] **σκαφεῖα** ('(other) digging-implements'). The neuter noun σκαφεῖον – here only, in the treatise – has multiple applications: see LSJ s. v., where the present passage is classified under I, *spade, hoe, mattock*. Most of my predecessors agree: 'Grabscheite' (Diels-Schramm 49); 'd'outils de terrassiers' (Garlan 305); 'digging tools' (B. Campbell, *Military Writers* 160). Only Lawrence 89 differs, with 'basins'. If the majority view is correct, as parallels would undoubtedly suggest (e. g. Diod.Sic. 4.31.7, τοὺς ἀμπελῶνας σκάπτειν ἀναγκάζοντα τῷ σκαφείῳ πατάξας ἀπέκτεινεν; Lucian, *Philops.* 31, σκάπτειν λαβόντας δικέλλας καὶ σκαφεῖα), Ph.'s list, which has already included mattocks and shovels (see lemma above), ends with a vague catch-all term.

B50.1–2 [*90.2–3*] **Δεδοκιμάσθω δὲ ταῦτα πάντα κατ' εἰρήνην ἐν ταῖς <οὐ> χρείαις** ('Let all these things have been tested in peacetime in circumstances where they are <not> needed'). The manuscripts have ἐν ταῖς χρείαις. Graux wanted to delete it as an intrusive gloss; Schoene, Diels-Schramm 49 and Garlan 305 all prefer the solution (Vahlen ap. Schoene) of adding a negative.

While 'all these things' is reasonable way of referring back to a list, filling B49 [*89.46–90.2*], which has consisted mainly of inanimate objects, we are left uncertain as to whether the specialist military personnel (B49 under **μηχανοποιόν**) are also to have been 'tested'. (For δοκιμάζειν cf. already A45.1–2 [*83.15–16*], but used in a looser sense there. The one intended here has a much better parallel/precedent in *Bel.* 71.14–15, on testing the serviceability of swords: ταύτας γὰρ ὅταν βούλωνται δοκιμάζειν εἰ χρησταί εἰσιν, ἐπιλαβόμενοι κτλ. See also e. g. Polyaen. 5.47 on arms and armour: τὰ μὲν ὅπλα ἀριθμεῖν καὶ δοκιμάζειν in an anecdote about the early history of Leontini.)

B51.1–2 [*90.5–6*] **φορμοὺς δεῖ ὑπάρχειν ἐν τῇ πόλει ὡς ἰσχυροτάτους καὶ πλείστους** ('it is necessary to have available in the city baskets as sturdy and as numerous as possible'). The noun *phormos* has several senses (see LSJ s. v.), the common element between them, direct or indirect, being plaiting or wickerwork. The meaning Ph. intends does seem to be 'basket', because not only here but also at C33.3 [*93.31*] and D51.4 [*100.28*] the *phormoi* are filled with something. (At D47.2–3 [*100.15–16*] such filling is not stated but cannot be excluded.)

The purpose of the present passage's 'sturdy and numerous' baskets, blocking up any breaches in the wall, is made clear in the remainder of the sentence (πρὸς τὸ κτλ). What they are to be filled with (ἐμπιμπλάντας), however, is not specified – contrast φορμοὺς γῆς ἐμπλήσαντας at C33.3 and φορμοὺς ἐμπιπλῶντα ἀχύρων at D51.4; perhaps earth, stones or bricks; possibly, if available, the sand of Aen.Tact. 32.2 & 8 and (on Torone's defence against Timotheus in 364) Polyaen. 3.10.15.

B52.2 [*90.9*] **βύρσας** ('hides'). Mentioned again at D37.1–2 [*99.32–33*], where the attackers are to use them in the construction of wicker-tortoises. For that, see also and more generally D64 [*101.25–27*], with the synonym δέρματα. Naturally, their protective function could be no less valuable to defenders: the 'screens' (δέρρεις), for or associated with walls, mentioned in C5.3–5 [*91.13–15*] and C63.3 [*95.34*] will be, in practice, hide-screens.

Outside Ph. see e. g. Aen.Tact. 33.3 (coverings of 'felt and hides' for any wooden parts of the wall or its towers); Diod.Sic. 17.45.4 (defence of Tyre against Alexander), 20.91.6 (the shutters, καλύμματα, on Demetrius's helepolis at Rhodes, are ἐκ βυρσῶν περιεραμμένα); App. *Lib.* 67 (at Utica in 204, the elder P. Cornelius Scipio Africanus strips from the walls such 'hides and other coverings' as were protecting it). Note also Diod.Sic. 33.16.1: the terms on which Rome offers peace to two Iberian cities in the late 140s include the surrender of three thousand *bursai*.

B52.2 [*90.9*] **πίσσαν** ('pitch'). For its use by defenders see C55.3 [*95.7*]; by attackers, D104.2–3 [*104.20–21*]. Both of those passages illustrate one of the cardinal qualities of pitch (a natural product of conifers, produced by tapping or burning) in a military context: its ready inflammability. For that cf. also Aen. Tact. 33.1 and 35.1 – in assocation, in both, with sulphur and oakum, as here (B52.3 [*90.10*] and B52.4 [*90.11*]); likewise e. g. App. *Mith.*141, *Illyr.*32. For pitch and sulphur see also Thuc. 2.77.4 and 4.100.4, Joseph. *BJ* 3.228; for pitch and oakum, Diod.Sic. 14.51.2, Dion.Hal. *AR* 20.1.7, App. *Annib.* 140; and cf. Polyaen. 4.6.3 (defending their city against Antigonus Gonatas in the 260s, the Megarians disperse his elephants by letting loose pitch-covered burning pigs).

The other sovereign attribute of pitch was its preservative, waterproofing capacity. This could be put to use in the roofs of buildings (Athenian decree about the

temple of Aphrodite Pandemos, 280s: Syll.[3] 375 [IG ii[2] 659] lines 25–26, and parallels) but was especially important in naval matters. See variously e.g.: the anecdote in Aen.Tact. 11.3, where a coup takes place while (*inter alia*) the harbour-boom at Chios has been removed for a new coat of pitch; Syll.[3] 135 (RO no.12), the treaty between king Amyntas III of Macedon and the Chalkidian League (390s or 380s), in which the king allows export-rights of both pitch and timber to his new allies (lines 9–11); and generally Casson, *Ships* 211–212.

All in all, any city (whether maritime or not) would want ample reserves of pitch, and would be glad when they were increased, as those of post-earthquake Rhodes were by Antigonus Doson (B16 under **στρωτῆρας**); see Plb. 5.89.6, drawing a distinction between 'pitch' and 'raw (pitch)', i.e. respectively solid (by the talent) and liquid (by the amphora; tar, in effect); in Latin terminology, *pix dura* and *pix liquida*. Ph.'s simple specification of πίσσα leaves unclear which form he wanted; Plb. loc.cit. might suggest dry, but not prove it.

See generally Walbank in HCP 1.620; J. André, 'La résine et la poix dans l'Antiquité; technique et terminologie', *AC* 33 (1964) 86–97; Meiggs, *Trees* 467–471 (Appendix 7).

B52.2 [*90.9*] **μόλιβον** ('lead'). See already A8.3 [*80.7*] and again C56.6 [*95.14*]; and used by the attackers in D34.3 [*99.23*]. In Ph. μόλιβος is the noun, μολιβοῦς or μολιβδοῦς the adjective; no μολυ- forms.

Unlike such things as hides and pitch, lead (Healy, *Pliny* 320–326) is something that many of Ph.'s cities will not have been able to count among their own natural resources; it will have had to be imported, directly or indirectly, from one of the places where it was mined (generally as part of the process of mining the ore from which silver was extracted), such as Macedonia. Post-earthquake Rhodes – see under the preceding lemma – received three thousand talents of lead from Antigonus Doson's wife Chryseis, a.k.a. Phthia (Plb. 5.89.7), doubtless a far greater quantity than the cities being advised here by Ph. will have needed to stockpile. (Incidentally, Ph. mentions slingers – whose ammunition was lead shot – only as attacking troops: D66.3 [*101.33*].) On lead counterweights in siege engines see Whitehead and Blyth, *Athenaeus* 160–161; Whitehead, *Apollodorus* 102–103.

Besides the testimony collected at C56 under **ἴνα**, defensive uses of lead by the otherwise unattested Athenocles (third century?) are mentioned in Polyaen. 6.3: stretching 'beams of lead' sideways along the battlements, to blunt the rams and drills; and when that had failed, pouring molten lead onto the enemy machines.

B52.3 [*90.10*] **θεῖον** ('sulphur'). Mentioned again at C55.3–4 [*95.7–8*], in conjunction with pitch; and see above under **πίσσαν**. Sulphur was, and is, plentiful in volcanic regions; Healy, *Pliny* 246–249. Its inclusion here in Ph.'s list of strategically necessary commodities does primarily reflect its value for any kind of fire-raising; sulphur is, after all, the Biblical 'brimstone' (still in LSJ s.v.), indicative – generally in association with fire – of divine wrath in both the Old and the New Testaments. But it did also have other uses, not all of them military. Sulphur in purification and fumigation is attested from Homer onwards (*Iliad* 16.228, *Odyssey* 21.481–482), and this developed into its prominence, with fewer or no religious

overtones, in veterinary medicine (for external application) and pest-elimination. There are several recommendations of this kind in the *Geoponica* (12.8.1, 13.14.3, 16.7.1, 16.17.1, 17.24.2, 18.15.3), and cf. generally e.g. Diosc. *de mat.med.* 5.107.1–6.

B52.3 [*90.10*] **σχοινία παχέα καὶ λεπτά** ('ropes thick and thin'). 'Ropes' are mentioned again at C4.1–2 [*91.9–10*], where strong defensive nets are woven out of them. A term Ph. uses elsewhere, καλώδια (A37.7–8 [*82.38–39*], C9 [*91.28–33*], C66 [*95.44–49*], and from the attackers' perspective D75.2 [*102.24*]), might be equatable with the present passage's 'thin' ropes. For σχοινία λεπτά elsewhere see e.g. Strab. 15.1.67, on the Indians' imitation of sponges by creating agglomerations of 'hairs and σ. λ. and threads'; and *Par.Pol.* 236.4 (27.81–82) on the advantage of having σ. λ. bound around the sidebars of the lightweight ladder at the apex of the reconnaissance-ladder contrivance attributed to Apollodorus Mechanicus (161.9–164.4: in fact a later interpolation; see Whitehead, *Apollodorus* 105–108). In any event Ph.'s own σ. λ. need to be visualized as sturdy enough, 'thin' notwithstanding, to differentiate them from the σπειράματα of B52.5 [*90.12*], q.v. below.

B52.3 [*90.10*] **χάρακα** ('stakes'). See A37 under **Αἱ δὲ χαρακώσεις**.

B52.4 [*90.11*] **φῦκος** ('seaweed'). See A76 under **σάξαντας**.

B52.4 [*90.11*] **στυππίον** ('oakum'). Oakum, a.k.a. tow, is old rope, its fibres untwisted and picked apart. For its uses, typically in the sort of fire-related contexts where pitch and/or sulphur were also used, see C41.2–3 [*94.9–10*] and C55.4 [*95.8*], and above under **πίσσαν**; in D73.4–5 [*102.15–16*] the attacking side stealthily climb ladders made of it. (If one may judge by the manuscripts, Ph. used the *stu-* and *sti-* forms of the word indiscriminately.)

Despite being in essence a waste product, its practical value was high: [Demosth.] 47.20 lists it, together with sail-cloth and ropes, as a commodity necessary to equip Athenian triremes in the mid-fourth century (for caulking purposes: Casson, *Ships* 209 n.39); and later it earned a place amongst Ptolemy III's post-earthquake gifts to Rhodes (Plb. 5.89.2: three thousand talents'-weight).

B52.4 [*90.11*] **οἶνον καὶ ἔλαιον** ('wine and oil'). For wine in a "ration" recipe (and diuretic) see B42.4–7 [*89.18–21*]; but D88.6 [*103.24*] will include it in a list of basic items necessary to feed the attackers, and naturally the same was true of their besieged opponents.

On oil see B35 under **ἐλαίου**.

B52.4 [*90.11*] **ὄξος** ('vinegar'). Already mentioned in B9 [*86.47–87.1*] and B10.7 [*87.8*] as a substance employed in the preservation of grain; shortly to be recommended for purifying foul water (B54 [*90.24–27*]); and also part of this roster of strategically valuable products because of its tried-and-tested merits as a fire retardant (D34.6 [*99.26*] – addressed to the attackers but equally relevant to either side).

B52.5 [*90.12*] **σπειράματα** ('(?)balls of twine'). The manuscripts have σπέρματα, 'seeds', retained by Schoene in preference to either of the emendations noted in his apparatus: σπάρτα (Buecheler) and σπειράματα (Diels). Diels-Schramm 49 print the latter and translate it 'Seile'. Garlan 306 also proffers σπειράματα, but without flagging it up as an emendation – and translating it 'semences', as if he had adhered to the paradosis. I too accept σπειράματα, albeit with no great conviction. Another possibility might be στρέμματα, as (e.g.) in the Septuagint version of the story of Samson and Delilah (στρέμμα στιππύου: *Judges* 16.9). Either way, precisely what Ph. meant by the term is unclear, but after 'ropes thick and thin' earlier in the list (see above under **σχοινία**) the scope does seem restricted to the general area of thread or (as Lawrence 89) twine.

B52.5–6 [*90.12–13*] **ξύλα καύσιμα [ὡς πλεῖστα] καὶ ναυπηγήσιμα ὡς πλεῖστα στρογγύλα καὶ τετράγωνα** ('timbers for burning and (ones) for ship-building, (the latter) both round and square, as many as possible'). Schoene was content to retain two instances of ὡς πλεῖστα in the same sentence, though he noted Brinkmann's wish to delete the first of them. Both Diels-Schramm 49 and Garlan 306 implement that deletion. (Perhaps, though, the second ὡς πλεῖστα is the intruder.)

If it were not self-evident anyway, the vital importance of ξύλα to Ph.'s city is shown by their inclusion in the one-word S.O.S. messages (calling for more) transmittable by the signalling device of B55 [*90.28–34*]. Aside from the concern not to forget firewood – where Ph's 'ξύλα' seems a rather grand word for what others might have called φάκελοι, φρύγανα, or the like – the most immediately striking thing here is the designation of the 'timbers' proper as ναυπηγήσιμα: 'round' ones for masts and spars, 'square' for hulls and other general construction. Compare e.g. [Xen.] *Ath. Pol.* 2.11; Thuc. 4.108.1, 7.25.2; Xen. *Anab.* 6.4.5, *Hell.* 5.2.16; lines 9–11 of Syll.^{3} 135/RO no.12 (the Amyntas/Chalkidike alliance: see above under **πίσσαν**), ἐ<ξ>αγωγὴ δ' ἔστω καὶ πίσσης καὶ ξύλων | οἰκοδομιστηρίωμ (sic) πάντων, ναυπηγη|σίμων δὲ πλὴν ἐλατίνων; [Demosth.] 17.28; Plut. *Demetr.* 10.1; Plb. 5.89.1 (amongst Ptolemy III's post-earthquake gifts to Rhodes); and comparable phrases with other nouns, usually ὕλη, elsewhere. (Note also the associated 'oars': next lemma.) Here as certainly elsewhere, the adjective should be understood literally but also broadly, i.e. embracing the maintenance and repair of ships as well as their construction *ab initio* (which might often, one would think, have been impracticable under siege conditions). For completeness's sake Ph.'s list ought also to have included the other commodities needed: pitch, oakum and ropes are there (see earlier lemmata) but not, most obviously, linen for the sails (and for other purposes that Ph. does mention: see C65 [*95.39–44*]). In any event, all cities, including those without war-fleets or the geographical means to use them, will also have been well-advised to stockpile timbers suitable for building (ξύλα οἰκοδομιστήρια, as above), including machine-building, and other non-nautical purposes. (A shortage of timber in the context of building granaries has been contemplated in B11.1–2 [*87.9–10*], q.v.)

B52.7 [*90.14*] **κώπας** ('oars'). A particular and crucial subset of the 'round' ship-building timbers which immediately precede them in the list. For separate mention of them, like this, cf. e.g.: Hdt. 5.23.2 (Megabazus warns King Darius I of the dangers of having allowed Histiaeus of Miletus to establish himself in western Thrace 'where there is no end of shipbuilding wood and many oars', ἵνα ἴδῃ τε ναυπηγήσιμός ἐστι ἄφθονος καὶ πολλοὶ κωπέες); IG i^3 89, the alliance between Athens and king Perdiccas II of Macedon ?417–413, restricting the export of oars to Athenians (line 31: – καὶ οὐδένα κο]πέας ἐχσάγεν ἐάσο ἐὰμ μὲ 'Αθε[ναίο -); Andoc. 2.11–14, on his own provision of Macedonian oars, by courtesy of king Archelaus (cf. IG i^3 117.30: χσύλ]α καὶ κοπέας), to the Athenian fleet in 411.

Fir, ἐλάτη, was best (which perhaps explains Amyntas's πλὴν ἐλατίνων: see under the preceding lemma): Meiggs, *Trees* 118–120; Casson, *Ships* 46.

B52.7 [*90.14*] **φοινικίνας σανίδας** ('date-palm planks'). See B1 under **καὶ φοινικικούς**.

B52.7 [*90.14*] **δᾷδας** ('firebrands'). Pine-and-resin torches, in practice. Mentioned only here in the treatise; I have differentiated in translation between them and *lampades*, the term Ph. uses elsewhere (C39.5 [*94.5*], D41.3 [*99.50*], D49.2 [*100.21*], D104.2 [*104.20*]), though it does not seem likely that a substantive difference is entailed.

Vocabulary aside, torches are an unsurprising inclusion in Ph.'s list (even though they might represent a risk to a city under siege. Aen.Tact. 10.25–26 recommends a ban on torches and lanterns at night-time, in case they are used in political intrigues or to communicate with the enemy; instances of this include Plut. *Alc.* 30.4–5 and Diod.Sic. 13.67.3 on Alcibiades at, respectively, Selymbria and Byzantium in 408). For effective use (of various kinds) of torches by defenders see e.g.: Diod.Sic. 14.51.2 (Motya, 397); Diod.Sic. 17.26.3 and Arr. *Anab.* 1.22.2 (Halikarnassos, 334); Arr. *Anab.* 2.19.1 (Tyre, 332); Diod.Sic. 20.87.2 (Rhodes, 305); App. *Annib.* 140 (Tarentum, 212).

B53.1–2 [*90.14–15*] **τὸ Ἀραβικὸν φάρμακον** ('the Arabian potion'). Ph.'s "store-cupboard" list, still in the accusative case, continues with various poisons, which (as the closing part of this long sentence explains) can be used for contaminating water that enemies are likely to drink and for poisoning the projectiles fired against them: see B53.6–11 [*90.19–24*]. The third purpose given there, burning the opponents' machines, must relate not to these poisons but to some of the substances given earlier in the list (sulphur, oakum, torches); see also below under **ναπτάλιον**, and further under **πρὸς τὸ φθειρεῖν**.

This first item does not obviously correspond with anything else called 'Arabian' by medical writers, and is otherwise unidentifiable.

B53.2–4 [*90.15–17*] **κογχύλιον τὸ ἐν τῇ λίμνῃ γιγνόμενον, ἣ ἀπέχει ἀπὸ Ἄκης πεντήκοντα σταδίους** ('a small mollusc, the one found in the lake which is fifty stades (9.24 km.) distant from (?)Ake'). On edible shellfish see generally Dalby, *Food* 300–301. The unidentifiable freshwater specimen Ph. has in mind here, however, had evidently been discovered to be inedible, indeed positively toxic (by containing what nowadays would be classified as a neurotoxin such as saxitoxin) – and as such was excellent for poisoning water. (Jul. Afr., *Kest.* 1.2.101–102 makes that

claim about the maritime *porphyra*, a.k.a. murex: τῷ ἰχθυΐνῳ ἐλαίῳ ἐγχεομένῳ εἰς αὐτὰ καὶ τῇ θαλαττίᾳ πορφύρᾳ, ἅπερ ἐπὶ πολὺν χρόνον ἅπαν ὕδωρ ἄποτον ποιεῖ.)

Its habitat, as apparently given here, could hardly be more precise, but in fact the text is dubious. The manuscripts give ἀπὸ ἀκτίς; emendation to ἀκτῆς could render it grammatical but not make it the specific toponym that the context seems to require. The emendation ἀπὸ Ἄκης (tentatively suggested by Buecheler ap. Schoene) is printed by both Diels-Schramm 49 – where it is boldly described as a correction – and by Garlan 306, though in his commentary thereto (374 n.53*b*) Garlan expresses a doubt: 'peut-être s'agissait-il d'un autre lieu, appelé "La Pointe"?' Places called Akte can certainly be found, including the Akte promontory in Attica and as the alternative name for the Athos peninsula in the N Aegean; even so, Ake (in Phoenicia) does seem the most persuasive option. (I note in passing that its name is a (standard) restoration not only here but also in Isaeus 4.7, by Valckenaer, and [Demosth.] 52.30, by Valesius.)

Though no such topographical feature as a lake is to be seen in the locality nowadays, Lawrence 88 comments that '[t]he subsequent accretion of alluvium could have caused the disappearance of a marsh had it been situated 50 stades *south* of Acre'.

B53.4 [*90.17*] **ἰξόν** ('mistletoe'). See generally LSJ s.v. ἰξός, I. Garlan 374 supposes (on no discernible basis) that Ph. is more likely to have in mind here *Loranthus europaeus* than the widespread *Viscum album*. In any event, Ph.'s appears to be the only ancient text to assert the toxicity of mistletoe, commonplace though it is in more recent botanical and medical writings.

The noun reappears at D35.1–3 [*99.26–28*], but in a (regular) transferred sense as birdlime, used as a fire-retardant – no doubt the explanation of its inclusion here in this list of strategic commodities.

B53.4–5 [*90.17–18*] **σαλαμάνδρας καὶ ἰὸν ἐχέων καὶ ἀσπίδων** ('salamanders and poison of vipers and of asps'). As with mistletoe, Ph. takes for granted the toxicity of salamanders (on which see e.g. Diosc. *de mat.med.* 2.70.5.1–6) without needing to specify it. For all three of Ph.'s items together see Jul. Afr., *Kest.* 2.5.10–12: φασὶ δέ τινες τῶν ἀρχαίων ὅτι καὶ τοῦ ἔχεως ἰὸς καὶ ἀσπίδος σαλαμάνδρας τε εἰς τοῦτο [preparing poison arrows] ἀπαράβατος.

An episode involving the use of arrows poisoned with snake venom, the Brahmins vs. Alexander in 326/5, is related by several of the sources on that campaign: Diod.Sic. 17.103, Curtius Rufus 9.8.20–28, Justin 12.10.1–3. See also Garlan 374 n.53*h*, registering the non-Greek nature of the practice, with which, nevertheless, Ph. appears to be perfectly comfortable.

B53.5 [*90.18*] **ναπτάλιον <ὃ> ἐν Βαβυλῶνι γίνεται** ('naphtha, which is found in Babylon'). The noun is a *hapax legomenon*, and of indeterminable gender: Arnim, *Index* 53 assumes feminine; LSJ s.v. gives it as neuter or feminine. Either way, it is Ph.'s variant on νάφθα, a word borrowed by both Greek and Latin from Persian, which Ph. uses (if an orthodox textual emendation is correct: see the Comm. there) at C39.4 [*94.4*]. The Romans glossed it as 'liquid bitumen', which is indeed the

phrase used by Vitruv. 1.5.8 in his echo of this very passage: see **Appendix 1**. Besides Ph. and Vitruvius, Pliny (*HN* 35.51) affirms its connection with Babylon. (Lawrence 88 protests that 'the bitumen wells at Hit are a long distance from Babylon and strictly not even in Babylonia', but the ancients were satisfied with broad geographical attributions.) See generally R.J. Forbes, *Bitumen and Petroleum in Antiquity* (Leiden 1936), summarized in *Studies in Ancient Technology* I (Leiden 1955 and reprints) 32–43; Healy, *Pliny* 254–257.

It is presumably the toxic properties of naphtha/bitumen which account for its inclusion here, though its flammability will also be relevant, in the light of both B53.7–9 [*90.20–22*], κἂν προελώμεθα … τὰ μηχανήματα ἐμπιπράναι, and C39.4–6 [*94.4–6*], ἢ τῇ νάφθᾳ, ἐὰν ἔχῃς, ῥάναντα καὶ λαμπάδας ἄνωθεν ἐμβαλόντα κατακαῦσαι.

B53.6 [*90.19*] **ἰχθυηρὸν ἔλαιον** ('fish oil'). The adjective ἰχθυηρόν is the standard correction, by Thévenot, of the transmitted ἰσχυρόν (P) or ἰσχυῆρον (sic: V); it derives justification from the passage of Julius Africanus quoted above, under **κογχύλιον**.

Since so many fish oils are positively beneficial to human health, Ph. must be thinking here of particular species of fish – analogous to the freshwater mollusc earlier in the list – where that was not the case. (Present-day concerns about the toxicity levels of fish oil focus on an issue irrelevant to the ancient world: the build-up of mercury and other toxins in the fish.) The same point would apply if Lawrence 89 and Rihll, *Catapult* 13 were right to understand Ph.'s phrase as fish 'glue', but that appears to be something different, i.e. the collagen isinglass; see generally J. Scarborough, 'Fish glue (Gr. ΙΧΘΥΟΚΟΛΛΑ) in Hellenistic and Roman medicine and pharmacology', *CPh* 110 (2015) 55–65.

B53.6–11 [*90.19–24*] **πρὸς τὸ φθειρεῖν πολεμίων ἐπιπορευομένων τὰ ὕδατα, κἂν προελώμεθα κατὰ τοὺς γινομένους κινδύνους [πρὸς] τὰ μηχανήματα ἐμπιπράναι καὶ ἀλείφειν τὰ βέλη, ἵνα φόβον καὶ φθορὰν ταχεῖαν παρασκευάζῃ τοῖς τιτρωσκομένοις καὶ προσβάλλουσι πρὸς τὸ τεῖχος** ('with a view to fouling the waters of enemies as they approach, and if, during the combats which occur, we choose to burn the(ir) machines and to smear (our own) projectiles, in order that they may cause fear and a quick death to men who are wounded and attacking the wall.'). These clauses of purpose/intent bring to an end a paratactic sequence of items that has begun at B52.1–2 [*90.8–9*] with χωρὶς δὲ τούτων βύρσας, itself a continuation of δεῖ ὑπάρχειν ἐν τῇ πόλει at B51.1–2 [*90.5–6*]. In practice, nevertheless, their application cannot extend back beyond the 'Arabian potion' which begins B53 [*90.14–24*]. Within B53.1–7 [*90.14–20*] itself, some of the items mentioned fall readily under one of the three heads indicated (fouling water, burning machines, poisoning projectiles), though one or two instances, as has been seen above, are ambiguous. It may well be that in Ph.'s mind some of these substances fulfilled more than one role.

B54 [90.24–27]: purifying foul water

B54.1–2 [*90.24–25*] **Ἐὰν δὲ σαπρὰ γένηται τὰ ὕδατα** ('If the waters become foul'). Aen Tact. 40.8 lists 'the means of making water fit to drink' (Περὶ … ὑδάτων ὡς δεῖ πότιμα ποιεῖν) as one of the topics covered in his (lost) *Paraskeuastikē biblos*. Ph. himself, at D91–92 [*103.30–33*], refers back to the present discussion as being ἐν τοῖς Παρασκευαστικοῖς, 'as though he had given part [B] that title' (Lawrence 88).

Here in part B the topic of poisoning the advancing enemy's waters (τὸ φθειρεῖν πολεμίων ἐπιπορευομένων τὰ ὕδατα: B53.6–7 [*90.19–20*]) appears to lead naturally on to that of purifying one's own. (Schoene did not act on his suggestion that B54 might be better transferred earlier, to follow B48 [*89.38–46*].) The symmetry is imprecise, however. The ὕδατα now envisaged have not been deliberately contaminated with deadly poisons but are simply foul and and putrid in the normal way – a circumstance which, as the remainder of the sentence shows, Ph. considers easy enough to rectify.

For waters described as σαπρά cf. generally e.g. Aristot. *de sensu* 443b11–12. There were also specific stretches of water which acquired that name in the upper case: the 'Sapra Thalassa', a gulf near Byzantium, and Lake Sapra in the Cimmerian Bosporus. Ph., naturally, is thinking of wells and other 'waters' more limited in their scope.

B54.2 [*90.25*] **κρίθινον ἐμβάλλειν δεῖ θερμὸν** ('it is necessary to put in hot barley(?-meal)'. Garlan 306 translates κρίθινον as 'orge' (barley)', i.e. as if Ph. had written κριθάς (cf. B6.1 [*86.39*]) or κριθήν (cf. B27.2 [*88.9*]); a note (Garlan 374 n.54*b*) adds that he knows of no parallel. Yet since κρίθινον is an adjective, a masculine or neuter noun must be presupposed. In general terms Dalby, *Food* 46 registers *artos krithinos*, but the present context is unlikely to entail loaves of bread. Diels-Schramm 50 translate 'Gerstenbier'. In English the traditional term for a strong, sweet, dark ale would in fact be barley-*wine*, which is also the term the Greek sources themselves use: see especially Xen. *Anab.* 4.5.26 (in a village north of Armenia the mercenaries drink *oinos krithinos* from large bowls, through straws) and a fragment of Polybius (34.9.15, in Athen. *Deipn.*1.16C) on a luxury-loving Iberian king whose house contained bowls full of *oinos krithinos*. See also Athen. *Deipn.* 1.34B, which cites 'Dio from the Academy' (D. of Alexandria, first century; mentioned by Cicero and Strabo) to the effect that Egyptians too poor to drink (*sc.* grape) *oinos* drank τὸν ἐκ τῶν κριθῶν γενόμενον; also Aristotle's amusing assertion (fr.106 Rose, again in the dossier at Athen. *Deipn.* 10.447A-D) that wine-drinkers, after excessive consumption, fall forwards whereas οἱ τὸν κρίθινον πεπωκότες topple backwards.

If Ph. here did not mean *oinos krithinos* proper – whether classified as ale or wine – but another kind of liquid involving barley, other attested uses of the adjective are more generic: Hippocratic literature mentions barley 'drink' (ποτόν: *de diaeta in morbis acutis* 17.28) and barley 'water' (ὕδωρ: *de diaeta acutorum* 10.71), and Plutarch alludes to a σύκινον πόμα καὶ κρίθινον (*Mor.* 752B).

All that said, a distinct possibility remains that the noun implicit in Ph.'s κρίθινον is ἄλευρον ('meal') or something of the kind. *Geop.* 2.5.14 credits Paxamus, in the first century (FGrH 377 [= Suda π 253]; Dalby, *Food* 252), with the doctrine that 'if the waters be bitter, we will pound coral and put it in. Or we could pound barley, tie it into a bag and immerse it in the waters' (εἰ δὲ πικρὰ εἴη τὰ ὕδατα, κοράλλιον κόψαμιτες ἐμβαλοῦμεν. ἢ κριθὰς κόψαντες καὶ εἰς ῥάκος ἐνδήσαντες, καταθώμεθα ἐν τοῖς ὕδασι).

B54.2–3 [*90.25–26*] **<ἢ> εἰς τοὺς δύο χοέας ὄξους βελτίστου ὅσον κύαθον ζέσαντος ἐγχέαι** ('<or> pour into every two choes (6.568 l.) one kyathos (0.0456 l.) of best vinegar, boiled'). Since it is clear that another remedy begins here, the addition of <ἢ> (Brinkmann ap. Schoene) is standard.

The use of vinegar (B2 under **ὄξος**) in this context – not specified as boiled, however – is also recommended in e.g. *Sylloge tacticorum* 55.2: Χρήσιμον δὲ καὶ τὸ ὄξος τοῖς ὄζειν ἀρχομένοις ἐπιβαλλόμενον ὕδασι (going on to claim the addition of riverine pebbles as efficacious too). For 'best' vinegar cf. the 'best' honey of B32.8 [*88.37*], with Comm. thereto.

This is Ph.'s sole mention of both the chous (though for the half-chous see B35.1–2 [*88.43–44*]) and the kyathos – both, of course, here as quantified measures of capacity (LSJ s.v. χοῦς I and κύαθος II).

B55–57 [90.28–45]: a signalling system

B55.1–3 [*90.28–30*] **Δεῖ δὲ καὶ τρυπητῆρα χαλκοῦν ἢ κεραμεοῦν κατασκευάσαι μὴ ἔλασσον ἢ τέσσαρας χωροῦντα μετρητάς** ('It is necessary also to prepare a perforated vessel, of bronze or pot, with a capacity no less than four metretai (157.56 l.)'). Though the noun τρυπητήρ, used twice more in this subsection (B56.2 [*90.35*], B57.3 [*90.42*]), is a *hapax legomenon*, its meaning is plain from the context; cf. in any case the associated cognates τρυπᾶν (κἀκ τετρυπημένου: B56.2 [*90.35*]) and τρύπημα (ἴσα ἔχοντας τρυπήματα: B57.3 [*90.42*]).

For χωρεῖν in this sense of having a capacity of/room for, see generally LSJ s.v., III.

B55.3–4 [*90.30–31*] **ἐν ᾧ <παρασκευάσαντί τε φελλὸν καὶ ἐμπήξαντι βακτηρίαν, ἢ τριδάκτυλα ἴσα μέρη διαιρεῖται, καὶ> διαγράψαντι ἐν ταῖς μοίραις ἔσται γεγραμμένα τάδε** ('in which <for (someone who) has prepared a cork and fixed in a rod, divided into equal three-dactyl (5.77 cm.) parts, and> has drawn lines across, there will be the following captions in the parts'). Brinkmann ap. Schoene diagnosed a lacuna after ἐν ᾧ (Schoene himself was content with the paradosis); the lengthy supplement is Diels's, printed in Diels-Schramm 51. Garlan 306 too accepted it into his text but omitted to translate it.

Its justification is the equivalent section of Aen. Tact. as preserved in Plb. 10.44.2–4 (it does not independently survive): 'he says that those who intend to reveal a matter of urgency to each other by fire-signals must prepare (sc. two) pots, of exactly the same breadth and depth, the depth being some three cubits [1.386 m.],

the breadth a cubit [0.462 m.]. Then they should prepare corks, a little smaller in breadth than the mouths (of the pots), and in the middles of these fix in <rods divided into> equal three-dactyl parts, creating a clearcut linear distinction part by part. In each part should be written the most obvious and most universal things that occur in wartime' (Φησὶ γὰρ δεῖν τοὺς μέλλοντας ἀλλήλοις διὰ τῶν πυρσῶν δηλοῦν τὸ κατεπεῖγον ἀγγεῖα κατασκευάσαι κεραμεᾶ, κατά τε τὸ πλάτος καὶ κατὰ τὸ βάθος ἰσομεγέθη πρὸς ἀκρίβειαν· εἶναι δὲ μάλιστα τὸ μὲν βάθος τριῶν πηχῶν, τὸ δὲ πλάτος πήχεος. Εἶτα παρασκευσάσαι φελλοὺς βραχὺ κατὰ πλάτος ἐνδεεῖς τῶν στομάτων, ἐν δὲ τούτοις μέσοις ἐμπεπηγμέναι <βακτηρίας διῃρημένας εἰς> ἴσα μέρη τριδάκτυλα, καθ' ἕκαστον δὲ μέρος εἶναι περιγραφὴν εὔσημον. Ἐν ἑκάστῳ δὲ μέρει γεγράφθαι τὰ προφανέστατα καὶ καθολικώτατα τῶν ἐν τοῖς πολεμικοῖς συμβαινόντων). See further under the next two lemmata.

B55.4–7 [*90.31–34*] **νῆες σῖτος ξύλα ὅπλα στρατιῶται καὶ ἄλλο ἐάν τι θέλῃς γράψαι τῶν κατὰ πολιορκίαν ἢ κατ' ἄ<λλην τινα χρείαν> παρασκευαζομένων καὶ ἐκλειπόντων** ('SHIPS GRAIN TIMBERS ARMS TROOPS and any of the other items you might want to write which are being prepared for a siege or a<nother emergency> and are lacking'). Schoene indicated a lacuna after κατά but did not fill it. Again the supplement is Diels's, printed by Diels-Schramm 51 and accepted by Garlan 306.

The list of such rubrics derived from Aeneas by Polybius – see under the preceding lemma – is different. It gives examples only (οἷον), and the ones provided are (Plb. 10.44.5–6): 'in the very first (part), that CAVALRY ARE IN THE TERRITORY, in the second HEAVY INFANTRY, in the third LIGHT-ARMED TROOPS, next INFANTRY WITH CAVALRY, then BOATS, after that GRAIN (*sc.* NEEDED, <and> so on until in all the places there is written the main contingencies that reasonable probability would see as happening in wartime circumstances' (εὐθέως ἐν τῷ πρώτῳ, διότι "πάρεισιν ἱππεῖς εἰς τὴν χώραν", ἐν δὲ τῷ δευτέρῳ διότι "πέζοι βαρεῖς", ἐν δὲ τῷ τρίτῳ "ψιλοί", τούτων δὲ ἑξῆς "πέζοι μεθ' ἱππέων", εἶτα "πλοῖα", μετὰ δὲ ταῦτα "σῖτος", <καὶ> κατὰ τὸ συνεχὲς οὕτω, μέχρις ἂν ἐν πάσαις γραφῇ ταῖς χώραις τὰ μάλιστ' ἂν ἐκ τῶν εὐλόγων προνοίας τυγχάνοντα καὶ συμβαίνοντα κατὰ τοὺς ἐνεστῶτας καιροὺς ἐκ τῶν πολεμικῶν). And different again is the menu of topics employed, according to Polyaen. 6.16.2, by the Carthaginians on an unspecified occasion when they were ravaging Sicily and wanted 'to ensure that the necessary items could reach them quickly from Libya'; there the rubrics given are lack of warships, of supply vessels, of gold, of machines, of grain, of animals, and of 'arms and infantry and cavalry'.

Since the construction and operation of the actual device for transmitting these pre-prepared summary messages is itself rather different in Polyaenus – simply a pair of identical klepsydrai, from which the water ran out in the normal way – the differences in the messages to be sent arise from two source-traditions that, while they concern much the same substantive circumstances, are historiographically distinct from one another. By contrast, it is beyond doubt that Ph. is following Aeneas on this matter. Further close correspondences on what they each describe will be noted under the lemmata below, and we might reasonably have expected them to encompass two identical lists of rubrics. Instead, only σῖτος is common to them

both; and more broadly, Polybius introduces a complication into what Aeneas envisaged – or so Ph. repeatedly claims: see B57 under **ἵνα αἰσθάνῃ** – by juxtaposing 'we need *x*' messages (as also the Polyaenus/Carthaginian system *in toto*) with report-type ones such as 'cavalry have entered the territory'. And after that the categorization of several of the messages given is ambiguous: are 'boats', for instance, posing an enemy threat, or are they needed by the signalling side? All in all, discrepancies between the two menus are hardly surprising when we allow for three sources of change from the Aenean original: by Polybius, by Ph., and by Ph.'s epitomator(s).

B56.1–4 [*90.34–37*] **τούτων δὲ γενομένων κἀκ τετρυπημένου τοῦ τρυπητῆρος ὕδατος ἐκχυθέντος σημαίνειν τῆς νυκτὸς κατὰ τὰς πυρσείας κτλ** ('When these things have been done and water has been poured out of a perforation of the perforated vessel (it is necessary) to signal at night by means of beacons etc.'). These words, continuing through the remainder of B56–57 [*90.34–45*], are recognizably a summary of the remainder of what Polybius reports about Aeneas's scheme (Plb. 10.44.7–13), but recast, in a way which departs from a phrase-for-phrase correspondence. For convenience's sake I give the whole of the Polybius passage under the present lemma:

> When these things have been done he tells us to pierce both of the vessels with care, in such a way that the outflow pipes are equal and carry off an equal amount; then the vessels are to be filled with water, the corks with their rods laid on top, and the outflow pipes started running simultaneously. [8] Once this is happening, it is clear and inevitable – with everything equal and identical – that the the corks will descend into the vessels and the rods be hidden from view commensurately with the outflow of fluid. [9] Having verified that these processes do take place in uniform synchronization, we are then told to take one of the vessels to each of two places where it is the intention to watch out for the fire-signals, and position it there. [10] Then, when any of the things inscribed on the rods actually happens, he tells us to raise a torch and wait until those ordered to do so raise one in reply; and when both of the torches are visible at the same time to lower them and immediately start the outflow pipes running. [11] When, with the cork and the rod falling, the circumstance that you want to reveal reaches the lip of the vessel, he tells (the signaller) to raise the torch; [12] the others instantly stop up the outflow pipe and look to see which of the things written on the rod accords with the lip; [13] and this, provided everything is done at the same speed on both sides, will be what is shown (Τούτων δὲ γενομένων ἀμφότερα κελεύει τρῆσαι τὰ ἀγγεῖα πρὸς ἀκρίβειαν, ὥστε τοὺς αὐλίσκους ἴσους εἶναι καὶ κατ' ἴσον ἀπορρεῖν· εἶτα πληρώαντας ὕδατος ἐπιθεῖναι τοὺς φέλλους ἔχοντας <τὰς> βακτηρίας, κἄπειτα τοὺς αὐλίσκους ἀφεῖναι ῥεῖν ἅμα. [8] Τούτου δὲ συμβαίνοντος δῆλον ὡς ἀνάγκη πάντων ἴσων καὶ ὁμοίων ὄντων, καθ' ὅσον ἂν ἀπορρέῃ τὸ ὑγρόν, κατὰ τοσοῦτον τοὺς φέλλους καταβαίνειν καὶ τὰς βακτηρίας κρύπτεσθαι κατὰ τῶν ἀγγείων. [9] Ὅταν δὲ τὰ προειρημένα γένηται κατὰ τὸν χειρισμὸν ἰσοταχῆ καὶ σύμφωνα, τότε κομίσαντας ἐπὶ τοὺς τόπους, ἐν οἷς ἑκάτεροι μέλλουσι συντηρεῖν τὰς πυρσείας, ἑκάτερον θεῖναι τῶν ἀγγείων. [10] Εἶτ' ἐπὰν ἐμπέσῃ τι τῶν ἐν τῇ βακτηρίᾳ γεγραμμένων, πυρσὸν ἆραι κελεύει, καὶ μένειν, ἕως ἂν ἀνταίρωσιν οἱ συντεταγμένοι· γενομένων δὲ φανερῶν ἀμφοτέρων ἅμα τῶν πυρσῶν καθελεῖν, εἶτ' εὐθέως ἀφεῖναι τοὺς αὐλίσκους ῥεῖν. [11]) Ὅταν δὲ καταβαίνοντος τοῦ φέλλου καὶ τῆς βακτηρίας ἔλθῃ τῶν γεγραμμένων ὃ βούλει δηλοῦν κατὰ τὸ χεῖλος τοῦ τεύχους, ἆραι κελεύει τὸν πυρσόν· [12] τοὺς δ' ἑτέρους ἐπιλαβεῖν εὐθέως τὸν αὐλίσκον, καὶ σκοπεῖν τί κατὰ τὸ χεῖλός ἐστι τῶν ἐν τῇ βακτηρίᾳ γεγραμμένων· [13] ἔσται δὲ τοῦτο τὸ δηλούμενον πάντων ἰσοταχῶς παρ' ἀμφοτέροις κινουμένων).

Polybius's version of what Aeneas said is the clearer of the two, it must be conceded. How (epitomized) Ph. presents it is clumsy at times, but intelligible nonetheless; for a drawing see Diels-Schramm 50 fig.24. In any event Polybius goes on (in 10.45–47) to give, first, an unfavourable verdict on the Aenean (and Philonian) method – he declares it slightly superior to the primitive systems of earlier times but quite inadequate for the unpredictable variety and complexity of messages which might need to be conveyed – and then, at length, 'the most recent method, devised by Cleoxenus and Democlitus and perfected by me'. (This, as described, is a much more elaborate and sophisticated concept, entailing the transmission, in two stages, of the individual letters of any short, *ad hoc* message required. Cleoxenus and Democlitus are otherwise unknown, but since Ph. seems unaware of their system it was probably not devised earlier than the first half of the second century; so e.g. Garlan 376 n.55*a*; Bettalli, *Enea* 231.)

Modern critiques of the Aenean/Philonian system are proffered by W. Riepl, *Das Nachrichtwesen des Alterums* (Leipzig & Berlin 1913) 66–71, and H. Diels, *Antike Technik: Sieben Vorträge* (Leipzig & Berlin 1924) 81–82, both within broader discussion of Greek fire-signalling (Riepl 46–74, Diels 71–90). Further bibliography in Whitehead, *Aineias* 113, and add now T. Rihll, 'Simple and complex technology in Aineias: ladders and telegraphy', in Pretzler and Barley chap. 12.2.

B56.4–5 [*90.37–38*] **εἰς ὃ ἂν προαιρῇ στρατόπεδον ἢ πόλιν ἢ φυλακτήριον** ('to whatever camp or city or guardpost one prefers'). On the first and third of these terms see, respectively, A58 under **τὸν αὐτόν** and A17 under **καὶ κάτωθεν**. In the present context all three of them together expand a scenario which Plb. 10.45.5 (cf. under the preceding lemma) summarizes as help 'from the allies' (παρὰ τῶν συμμάχων).

B56.5 [*90.38*] **ἐκ διαδοχῆς** ('in succession'). This phrase appears again at D26.1–3 [*98.45–47*], but in its much more common application to waves of attackers; see Comm. thereto.

B57.5–6 [*90.44–45*] **ἵνα αἰσθάνῃ, τίνα χρείαν ἔχουσιν οἱ πολιορκούμενοι συνθέματος αὐτοῖς ὄντος** ('in order that you can tell what the men under siege are short of – as there is an agreed way of doing so'). If we include the transmitted rubrics themselves (B55.4–5 [*90.31–32*]), this makes four times in all – following on from ἐκλειπόντων at B55.7 [*90.34*] and τίνος δέονται οἱ πολιορκούμενοι at B56.7 [*90.40*] – that Ph. presents Aeneas's signalling-system as one designed specifically to convey what the signalling side was in need of, rather than being the multi-purpose means of reporting envisaged by the illustrative rubrics Polybius gives; cf. B55 under **νῆες**.

Even if σύνθεμα here had been spelled σύνθημα, as it is elsewhere in the treatise (C29.2 [*93.9*], C35.2 [*93.37*], C35.3 [*93.38*], C36.2–3 [*93.42–43*], C37.2 [*93.45*], C38.2 [*93.49*]; and cf. ὑποσύνθημα at C29.2 [*93.9*], C36.1 [*93.41*], and C37.1 [*93.44*]), it would not be appropriately translated 'password' as it is there. In the present context – paralleled in Polybius's introductory remarks to his presentation of the Aenean signalling scheme (10.43.10, περὶ ὧν γὰρ οὐκ ἐδέχετο προνοηθῆναι, περὶ τούτων οὐδὲ σύνθημα ποιήσασθαι δυνατόν) – a σύνθεμα/σύνθημα is not a secret, coded word or form of words but, more broadly, a shorthand way, pre-arranged between sender and receiver, of referring to something.

PART C: DEFENSIVE MEASURES

The Tyrians had a great abundance of catapults and other machines useful for sieges, and it was easy for them to prepare many others thanks to the engineers and other craftsmen of all kinds who were in Tyre. Because all kinds of novel devices were being prepared by them, the entire circuit of the city was filled with machines, particularly in the area where the mole was approaching the wall. […] The Tyrians were alarmed to see the mole grow, and they equipped many small vessels with both bolt-firers and (*sc.* stone-projecting) catapults and archers and slingers; they sailed up to the men working on the mole, killing many and wounding many others. […] With their craftsmen in bronze and engineers the Tyrians prepared ingenious items of assistance. Against the projectiles from the (enemy) catapults they prepared wheels divided by thick partitions; these they would spin with a certain mechanism, destroying some of the projectiles and deflecting others, and dissipating the force of them all. The stones propelled from the rock-projectors they would catch in soft and yielding materials and so weaken the power generated by the device. […] When the Macedonians moved up towers as high as the walls, extended assault-bridges on them and boldly attacked the parapets, the Tyrians used many items of assistance for wall-fighting that their artificers had thought of. They had (*sc.* for instance) forged large barbed tridents, with which they struck at close quarters the men standing on the towers; the tridents would stick in the men's shields, enabling them to be pulled forwards with the cables that had been attached; this necessitated a choice between releasing their shields and exposing their bodies to be seriously wounded by the many projectiles flying in, or else clinging to their shields for shame and falling to their death from the lofty towers. Other defenders cast fishing-nets over the men fighting their way across the assault-bridges; this rendered their hands useless and enabled them to be pulled off and fall from the assault-bridge to the ground. The defenders also came up with another ingenious idea to counter the Macedonians' courage. it trapped the bravest of the enemy in unavoidable and terrible torments. They prepared shields of bronze and iron, filled them with sand, and roasted them continuously over a fierce fire which made the sand red-hot. This, by means of a certain mechanism, they would scatter over the enemy troops who were fighting most boldly. […] At the same time the Phoenicians were pouring down fire and hurling down javelins and stones, and by the volume of their projectiles subduing the courage of their opponents. With sickle-bearing spars they would cut the ropes supporting the rams, thus nullifying the machines' force; with fire-throwers they would propel great fiery ingots into the massed enemy ranks, who were so packed together that the target could not be missed; with ravens and "iron hands" they would snatch up the men positioned on the (towers') breastworks. […] Alexander positioned his rock-projecting catapults in appropriate places, making the walls shake with the great stones they discharged, and with his bolt-firers sent out a host of all kinds of projectiles from the wooden towers, seriously wounding the men stationed on the walls. The Tyrians' counter-strategy to this was to fix marble wheels in front of the walls: spinning these by certain mechanisms they could break the catapult projectiles in flight and deflect them sideways, rendering their impact ineffective. In addition they stitched up seaweed-stuffed hides and skins in pairs, in readiness for the blows made by the rock-projectors; cushioned thus, the force of the stones being propelled was reduced. All in all, the Tyrians defended themselves robustly in every way, had a rich supply of items of assistance, and were bold in the face of their enemies.

(Diod.Sic. 17.41.2–45.5, abridged)

Tyre's resistance to Alexander the Great in 332 was ultimately to prove futile; but before that point had been reached, with its grim consequences for the defeated Tyrians, the siege is noteworthy for the ingenuity, versatility and determination of the defenders just as much as the attackers.

Diodorus's version of the event in fact has more rhetorical colour than my abridgement here has left in; and the fact that some of the detail he gives is paralleled neither in other accounts of this particular siege nor elsewhere induced W. W. Tarn (*Alexander the Great* (Cambridge 1948) 2.120–121) to attribute it to a lost Hellenistic textbook on siege warfare. However, since two of the items thus categorized by Tarn (and others), the barbed tridents and the shields filled with hot sand, are also in the account by Curtius Rufus 4.3.24–25 (cf. HCA 1.247), only the revolving anti-projectile wheels lack parallel and corroboration, whether in the context of this particular siege or elsewhere. For my purposes here the point is not crucial. Even if some individual 'items of assistance' (to use the term that Diodorus himself uses here, three times: βοηθήματα; cf. Plb. 1.22.3 on *corvi* as a βοήθημα πρὸς τὴν μάχην) may have infiltrated the narrative from the realms of theory and/or imagination, most of them are unexceptionable, historiographically and historically alike; and overall it remains the case that we have here a graphic vignette of the array of defensive tactics available to a city under attack a century before Ph. framed his recommendations on the matter.

Given that the approaches and procedures that Ph. does advocate, to defenders here in part C and to attackers in part D, are most unlikely to stem from personal experience on his part, it seems necessary to envisage him drawing heavily on written sources, by precursors who had already done some of the "spadework" on the subject(s). Aeneas and his *Paraskeusastikê biblos* lie behind at least some of Ph.'s scenarios which unfold before the enemy has arrived (cf. the Introduction to part B), but Ph.'s advice, now, relevant to a stage in proceedings when an attack is actually under way might be indebted, as well or instead, to anecdotally-driven material in lost writers who were the predecessors of Frontinus and Polyaenus in that regard. (See on this elusive topic E. L. Wheeler, 'Polyaenus: *Scriptor Militaris*', in K. Brodersen (ed.), *Polyainos: neue Studien* (Berlin 2010) 7–54, at 19–36.)

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C1 [90.46–49]: positioning one's own artillery

C1.1–2 [*90.46–47*] **Τούτων δὲ παρασκευασμένων πρὸ τῆς μελλούσης γενέσθαι προσβολῆς** ('With these things prepared before the attack that is expected to occur'). For what it is worth, I agree with Diels-Schramm 51 and Lawrence 89 in taking this πρό clause with what precedes it, rather than with the ensuing ἐφιστάναι δεῖ κτλ (next lemma). The punctuation in Garlan 307 ('Une fois achevés ces préparatifs, avant l'attaque qui s'annonce, il faut mettre en position etc.') is ambiguous on the matter. Either way, Garlan 282 n.9 (following Graux) notes the significance, here, of one of Ph.'s own internal divisions. (For the others see A87.1–4 [*86.18–21*] and D1.1–2 [*96.27–28*].)

C1.2–4 [*90.47–49*] **ἐφιστάναι δεῖ τὰ βέλη πάντα κατὰ τοὺς προσήκοντας ἑκάστῳ τόπους** ('it is necessary to instal all the artillery at the places appropriate to each'). The topic has been mentioned, without ever being discussed in any detail, at various points in part A: see A6.6 [*79.26*], A20.8–10 [*81.13–15*], A21 [*81.15–25*], A25 [*81.34–37*], A32 [*82.6–14*].

PART C: DEFENSIVE MEASURES

The Tyrians had a great abundance of catapults and other machines useful for sieges, and it was easy for them to prepare many others thanks to the engineers and other craftsmen of all kinds who were in Tyre. Because all kinds of novel devices were being prepared by them, the entire circuit of the city was filled with machines, particularly in the area where the mole was approaching the wall. […] The Tyrians were alarmed to see the mole grow, and they equipped many small vessels with both bolt-firers and (*sc.* stone-projecting) catapults and archers and slingers; they sailed up to the men working on the mole, killing many and wounding many others. […] With their craftsmen in bronze and engineers the Tyrians prepared ingenious items of assistance. Against the projectiles from the (enemy) catapults they prepared wheels divided by thick partitions; these they would spin with a certain mechanism, destroying some of the projectiles and deflecting others, and dissipating the force of them all. The stones propelled from the rock-projectors they would catch in soft and yielding materials and so weaken the power generated by the device. […] When the Macedonians moved up towers as high as the walls, extended assault-bridges on them and boldly attacked the parapets, the Tyrians used many items of assistance for wall-fighting that their artificers had thought of. They had (*sc.* for instance) forged large barbed tridents, with which they struck at close quarters the men standing on the towers; the tridents would stick in the men's shields, enabling them to be pulled forwards with the cables that had been attached; this necessitated a choice between releasing their shields and exposing their bodies to be seriously wounded by the many projectiles flying in, or else clinging to their shields for shame and falling to their death from the lofty towers. Other defenders cast fishing-nets over the men fighting their way across the assault-bridges; this rendered their hands useless and enabled them to be pulled off and fall from the assault-bridge to the ground. The defenders also came up with another ingenious idea to counter the Macedonians' courage; it trapped the bravest of the enemy in unavoidable and terrible torments. They prepared shields of bronze and iron, filled them with sand, and roasted them continuously over a fierce fire which made the sand red-hot. This, by means of a certain mechanism, they would scatter over the enemy troops who were fighting most boldly. […] At the same time the Phoenicians were pouring down fire and hurling down javelins and stones, and by the volume of their projectiles subduing the courage of their opponents. With sickle-bearing spars they would cut the ropes supporting the rams, thus nullifying the machines' force; with fire-throwers they would propel great fiery ingots into the massed enemy ranks, who were so packed together that the target could not be missed; with ravens and "iron hands" they would snatch up the men positioned on the (towers') breastworks. […] Alexander positioned his rock-projecting catapults in appropriate places, making the walls shake with the great stones they discharged, and with his bolt-firers sent out a host of all kinds of projectiles from the wooden towers, seriously wounding the men stationed on the walls. The Tyrians' counter-strategy to this was to fix marble wheels in front of the walls: spinning these by certain mechanisms they could break the catapult projectiles in flight and deflect them sideways, rendering their impact ineffective. In addition they stitched up seaweed-stuffed hides and skins in pairs, in readiness for the blows made by the rock-projectors; cushioned thus, the force of the stones being propelled was reduced. All in all, the Tyrians defended themselves robustly in every way, had a rich supply of items of assistance, and were bold in the face of their enemies.

(Diod.Sic. 17.41.2–45.5, abridged)

Tyre's resistance to Alexander the Great in 332 was ultimately to prove futile; but before that point had been reached, with its grim consequences for the defeated Tyrians, the siege is noteworthy for the ingenuity, versatility and determination of the defenders just as much as the attackers.

Diodorus's version of the event in fact has more rhetorical colour than my abridgement here has left in; and the fact that some of the detail he gives is paralleled neither in other accounts of this particular siege nor elsewhere induced W.W. Tarn (*Alexander the Great* (Cambridge 1948) 2.120–121) to attribute it to a lost Hellenistic textbook on siege warfare. However, since two of the items thus categorized by Tarn (and others), the barbed tridents and the shields filled with hot sand, are also in the account by Curtius Rufus 4.3.24–25 (cf. HCA 1.247), only the revolving anti-projectile wheels lack parallel and corroboration, whether in the context of this particular siege or elsewhere. For my purposes here the point is not crucial. Even if some individual 'items of assistance' (to use the term that Diodorus himself uses here, three times: βοηθήματα; cf. Plb. 1.22.3 on *corvi* as a βοήθημα πρὸς τὴν μάχην) may have infiltrated the narrative from the realms of theory and/or imagination, most of them are unexceptionable, historiographically and historically alike; and overall it remains the case that we have here a graphic vignette of the array of defensive tactics available to a city under attack a century before Ph. framed his recommendations on the matter.

Given that the approaches and procedures that Ph. does advocate, to defenders here in part C and to attackers in part D, are most unlikely to stem from personal experience on his part, it seems necessary to envisage him drawing heavily on written sources, by precursors who had already done some of the "spadework" on the subject(s). Aeneas and his *Paraskeusastikê biblos* lie behind at least some of Ph.'s scenarios which unfold before the enemy has arrived (cf. the Introduction to part B), but Ph.'s advice, now, relevant to a stage in proceedings when an attack is actually under way might be indebted, as well or instead, to anecdotally-driven material in lost writers who were the predecessors of Frontinus and Polyaenus in that regard. (See on this elusive topic E.L. Wheeler, 'Polyaenus: *Scriptor Militaris*', in K. Brodersen (ed.), *Polyainos: neue Studien* (Berlin 2010) 7–54, at 19–36.)

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C1 [90.46–49]: positioning one's own artillery

C1.1–2 [*90.46–47*] **Τούτων δὲ παρασκευασμένων πρὸ τῆς μελλούσης γενέσθαι προσβολῆς** ('With these things prepared before the attack that is expected to occur'). For what it is worth, I agree with Diels-Schramm 51 and Lawrence 89 in taking this πρό clause with what precedes it, rather than with the ensuing ἐφιστάναι δεῖ κτλ (next lemma). The punctuation in Garlan 307 ('Une fois achevés ces préparatifs, avant l'attaque qui s'annonce, il faut mettre en position etc.') is ambiguous on the matter. Either way, Garlan 282 n.9 (following Graux) notes the significance, here, of one of Ph.'s own internal divisions. (For the others see A87.1–4 [*86.18–21*] and D1.1–2 [*96.27–28*].)

C1.2–4 [*90.47–49*] **ἐφιστάναι δεῖ τὰ βέλη πάντα κατὰ τοὺς προσήκοντας ἑκάστῳ τόπους** ('it is necessary to instal all the artillery at the places appropriate to each'). The topic has been mentioned, without ever being discussed in any detail, at various points in part A: see A6.6 [*79.26*], A20.8–10 [*81.13–15*], A21 [*81.15–25*], A25 [*81.34–37*], A32 [*82.6–14*].

For the verb and phrase see again D9.2 [*97.10*], where the attacking commander does this (τὰ βέλη ἐπιστήσας πάντα), and cf. e.g. Xen. *Hell.* 2.2.4 (the Athenians face the Spartan blockade in 405: ἐκκλησίαν ἐποίησαν, ἐν ᾗ ἔδοξε [...] φυλακὰς ἐφιστάναι καὶ τἆλλα πάντα ὡς εἰς πολιορκίαν παρασκευάζειν τὴν πόλιν), and on artillery in particular Plb. 1.53.11 (the Romans in Sicily in 249: τούς τε καταπέλτας καὶ τοὺς πετροβόλους τοὺς ἐκ τῆς πόλεως ἐπιστήσαντες προσεδόκων τὸν ἐπίπλουν τῶν ὑπεναντίων).

C2 [90.49–91.3] (misplaced): conserving manpower

Schoene's realisation that C2 does not belong here has, quite rightly, become the orthodoxy. Its proper place must be somewhere later in part C (the mention of *politai* alongside *stratiôtai* – see the next lemma – rules out part D), but I am not aware of any specific suggestions, and it would be difficult to make one.

C2.1–3 [*90.49–51*] **<...> καὶ φείδεσθαι τῶν στρατιωτῶν καὶ τῶν πολιτῶν ὡς μάλιστα κατὰ τοὺς γινομένους κινδύνους** ('<...> and to be especially sparing of the troops and the citizens in respect of the combats that occur'). For the verb in this sense see generally LSJ s.v. φείδομαι, II.1. The comment there that in this sense it is most frequently used with a negative is illustrated by the only other instance here in Ph., Μὴ φείδου δὲ χρημάτων κτλ at D65.1–2 [*101.28–29*]. Positive applications, like the one in the present passage, begin with Pandaros ἵππων φειδόμενος at Homer, *Iliad* 5.202.

Garlan 376 n.2*b* comments that '[l]e mot στρατιώτης, par opposition à celui de πολίτης, a visiblement ici le sens particulier de mercenaire, comme c'est souvent le cas à l'époque hellénistique. De même en C18, 30 et 34, et ainsi qu'en D13'. His point does, on the face of it, manifestly apply to instances which mention 'soldiers' and 'citizens' together (besides C2.1–2 [*90.49–50*], C18.5–6 [*92.26–27*], C30.7–8 [*93.17–18*] and C34.1–2 [*93.32–33*], add D7.1–3 [*96.49–51*]) and also, in context, to D13.2–3 [*97.42–43*]. The criterion of immediate context might also be held to extend to B55.5 [*90.32*], on signalling for more; there, however, the 'soldiers' are likely in practical terms to be ones supplied by allies, and in my opinion the scope of the στρατιῶται whom Ph. mentions frequently elsewhere ought not to exclude that category of troops either, whether they are fighting in defence (C12.3–4 [*91.42–43*], C72.5–7 [*96.19–21*]) or attack (D11.4–5 [*97.33–34*], D19.1–3 [*98.17–19*], D24.2–3 [*98.35–36*], D26.1–3 [*98.45–47*], D37.4–5 [*99.35–36*], D68–70 [*101.37–102.2*], D75.3–4 [*102.25–26*], D89.3–4 [*103.27–28*], D103.3–4 [*104.11–12*]).

C2.3–4 [*90.51–91.1*] **μὴ ἐπιτρέπειν αὐτοῖς ἐμπηδῶσιν εἰκῇ τραυματίζεσθαι** ('not to allow them to make rushes at random and be wounded'). For the verb ἐμπηδᾶν (here a present participle agreeing with αὐτοῖς) in this sense cf. e.g. Diod. Sic. 18.72.6 (πάντων διὰ τὸν φόβον τεταραγμένων καὶ εἰς τὰς ναῦς ἐμπηδώντων); App. *Iber.* 383 (Scipio Aemilianus ἐς δύο διείλε τοὺς ἱππέας καὶ προσέταξεν αὐτῶν ἑκατέροις παρὰ μέρος ἐμπηδᾶν τοῖς πολεμίοις).

The adverb εἰκῇ – here only in the treatise, though see already *Bel.* 50.23–24, 52.33, 76.44, 77.3 – is prominent in Polybius's well-stocked vocabulary of disapproval. Military randomness, specifically, is censured in (e.g.) 1.76.7, 2.30.4, 5.98.3 & 9, 9.18.3, 11.24.1, 14.4.3 (παρακαλέσας ... μηδὲν εἰκῇ πράττειν).

C3–6 [91.3–19]: precautions and tactics against rock-projectors

C3.2–4 [*91.4–6*] **τὰς ἐκ τῶν φοινίκων σανίδας συνδήσαντας κατακρεμάσαι πρὸ τοῦ τείχους** ('to hang down in front of the wall planks bound together out of date-palms'). B. Campbell, *Military Writers* 160 has 'covers made from palm-*leaves* that have been tied together' (my emphasis), but σανίδας rules that out. See rather Diels-Schramm 52 ('die Palmenholztafeln'), Garlan 307 ('des planches de palmier'), Lawrence 89 ('boards of date-palms'); also Rihll, *Catapult* 87 ('slices of date-palm trunks'). See further under the next lemma.

Other constructions that involve a process of binding-together are mentioned at C53.5–6 [*94.47–48*] and C54.7 [*95.4*].

For hanging or draping items down a city wall see also D47.1–2 [*100.14–15*] (*triboloi* and *dokides*), and cf. e.g. Hdt. 2.121.γ1 (the headless corpse of a thief); Aen.Tact. 11.6 (deer-nets, boar-nets and sails, enabling hostile troops to climb into Chios) and 38.7 (recommendation to facilitate extramural stone-gathering, by hanging down baskets for the men to leave the city and boar-nets or stag-nets for their return); Joseph. *BJ* 3.187 (Josephus's laundry trick at Iotapata: see D8 under **τὰ ὕδατα**).

C3.4 [*91.6*] **(ἰσχυραὶ γάρ εἰσι καὶ δυσέμπρηστοι)** ('– for they are strong and hard to set alight –'). For the second adjective here cf. already A35.2–3 [*82.23–24*].

Lawrence 88 denounces this parenthetical phrase as an intrusive gloss: 'Philo had stayed long enough in Egypt to realize that the trunk of a date-palm can be split without effort because it consists of many separate fibres, which catch fire instantaneously and burn furiously till they are consumed after a few minutes; they are, however, extremely resilient and therefore suitable for cushioning impact'. One might well be tempted to agree (and to expel the phrase from the text in consequence), were it not that much the same view of palm-wood's strength and capacity to resist fire is expressed in material that quite possibly comes (via Agesistratus to Athenaeus Mechanicus and Vitruvius) from Ph.: see D10 under **τά τε μηχανήματα**, and **Appendix 2**. Rightly or wrongly, therefore, it does seems to be the view that he himself held.

On the qualities of this wood (also mentioned at B52.7 [*90.14*], D10.6 [*97.24*] (above), and D17.5 [*98.8*].) see generally Lammert, 'Kriegswesen' 57; Orlandos, *Matériaux* I 19–20.

C3.4–6 [*91.6–8*] **ἔπειτα μαλάγματα πρὸ αὐτῶν <, ᾗ> ἀλλήλαις ἐπιβάλλονται** ('and then paddings in front of them, where (the planks) are overlapped with each other'). Such 'paddings' – in the concrete sense II of LSJ s.v. ("Schutzkissen":

Arnim, *Index* 49) – will be mentioned again at C5.1–3 [*91.11–13*], and will also feature in some of Ph.'s other recommendations: see C66.4 [*95.47*] (a variant there for synonyms used in the preceding two chapters), D17.6 [*98.9*] and D51.6–8 [*100.30–32*]. The reflection of this in Veget. 4.23 – quoted at C9 under **ὧν χαλασθέντων** – uses the terms *centones* (quilts) and *culcitae* (mattresses).

In broad terms the precautions here, and in C3–6 generally, follow those advocated in Aen.Tact. 32.3. See also e. g. Diod.Sic. 17.43.1 (τοὺς δ' ἐκ τῶν πετροβόλων φερομένους λίθους δεχόμενοι μαλακαῖς τισι καὶ συνενδιδούσαις κατασκευαῖς) on the defence of Tyre against Alexander; and further under the next lemma.

C4.1–3 [*91.9–11*] **ἢ ἐκ τῶν σχοινίων πλέξαντας δίκτυα καὶ φύκους ἐμπλήσαντας καταspᾶν** ('alternatively, pull down nets woven out of ropes and filled with seaweed'). On seaweed in Ph. see generally A76 under **σάξαντας**; and seaweed-filled nets, specifically, feature also in D34.4–5 [*99.24–25*], τῷ φύκει διερῷ εἰς δίκτυα ἐμβαλόντα. In the present passage Schoene retained the transmitted φυλάκους, 'guards', which seems to make no sense here; Thévenot had preferred θύλακους, 'sacks' (registered in Arnim, *Index* 38), from the later manuscripts, but 'nets and sacks' leaves out what they are filled with. Genitive φύκους, proposed by Wesseling on the basis of Diod.Sic. 17.45.4 (see below) and endorsed by Brinkmann ap. Schoene with reference to D34.4–5 (above), is printed in both Diels-Schramm 52 and Garlan 307.

The present recommendation is echoed (albeit faintly) and elaborated in *Par. Pol.* 247.16–248.2 (39.30–35 Sullivan): 'great protection to a tower will be furnished by [...] nets of marine mosses or the so-called sea-leek, as these are capable not only of counteracting the burning of incendiaries but also of resisting the blows of stone-projectors' (Οὐ μικρὰν δὲ ὠφέλειαν τῷ πύργῳ ἐμπαρέξουσι ... δίκτυα ἐνύγρων βρύων ἢ τοῦ καλουμένου θαλασσοπράσου, ὡς δυνάμενα μὴ μόνον ταῖς ἐκ τῶν πυροβόλων ἀντιμάχεσθαι ἐμπρήσεσιν, ἀλλὰ καὶ πρὸς τὰς τῶν λιθοβόλων ἀντέχεσθαι πληγάς). (For 'sea-leek' the Byzantine writer apparently follows Athenaeus Mechanicus: see his 18.3–7, on protecting a filler tortoise, with Whitehead and Blyth, *Athenaeus* 116.) There is a well-recognized historical illustration of this in the defence of Tyre against Alexander (cf. under the preceding lemma). In Diodorus's version the resourceful Tyrians 'would stitch up hides and pairs of skins, stuffed with seaweed, and receive the blows of the rock-projectors into them; and as the impact was soft and yielding the force of the rocks being propelled was lessened' (βύρσας καὶ διπλᾶς διφθέρας πεφυκωμένας καταράπτοντες εἰς ταύτας ἀπεδέχοντο τὰς ἀπὸ τῶν πετροβόλων πληγάς· καὶ μαλακῆς τῆς ἐνδόσεως γινομένης ἐξελύετο τῶν φερομένων πετρῶν ἡ βία: Diod.Sic. 17.45.4). Since that event acquired such celebrity in the telling, it may well be that the maritime defenders' use of seaweed – where others would have naturally turned to chaff, wool or the like, as in Aen.Tact. 32.3 – gave rise to the generic advice in the Hellenistic and later theoretical literature. (The further suggestion of Rihll, *Catapult* 86–87, that the receptacles themselves might display a Phoenician/colonial link with Carthage as described in Diod.Sic. 19.106.4 – 'whenever any major misfortune happens to the city, their habit is to cover the walls with black sackcloths' – is ingenious but to my mind unconvincing. The sacks, as Rihll herself acknowledges, are in Aeneas; and even if that were not so, the Carthaginian 'habit' (which reappears in a slightly different form and in a naval context at 20.9.1) was evidently a solemn mourning ritual, not something to be exploited as a pragmatic preparation for siege.)

C5.1–3 [*91.11–13*] **Ἄνωθεν δ' ἐκ τῶν ἐκκειμένων ξύλων αἱ ὁρμιστηρίαι δέδενται τῶν σανίδων καὶ τῶν μαλαγμάτων** ('At the top, out of the extending timbers, the cables of the planks and of the paddings are bound'). This clause is inadvertently omitted in Lawrence 91.

Mention of the *sanides* and the *malagmata* takes up C3 [*91.3–9*], as if the alternative in C4 [*91.9–11*] had not intervened.

The feminine noun ὁρμιστηρία is otherwise attested only in Diod.Sic. 17.44.4, where it is used to describe the cables supporting Alexander's rams (τὰς τῶν κριῶν ὁρμιστηρίας) at Tyre. The fact that they were cut by the Tyrians' sickle-bearing spars on that occasion makes it doubly unlikely (i.e. together with what is known of ram-construction in general) that 'chains' would be the correct translation of ὁρμιστηρίαι there. B. Campbell, *Military Writers* 160–161 adopts it here in Ph., but inappropriately in my opinion; likewise LSJ s.v. Once again, what is at stake is these connections being *cut*: see the next lemma. My 'cables' follows Diels-Schramm 52 ('die Seile') and Garlan 307 ('les câbles de suspension'). Lawrence 91 opts for the non-committal 'fastenings'.

C5.3–5 [*91.13–15*] **δέρρεις δὲ δεῖ πρὸ αὐτῶν καταπετάσαι, ἵνα μὴ ὑπὸ τῶν βελῶν οἱ δεσμοὶ ἀποκόπτωνται** ('and it is necessary to spread out screens in front of them, in order that the bonds are not severed by the projectiles'). For δέρρεις see also C63.3 [*95.34*], ἢ δέρρει ἢ αὐλαίαις διαφρακτέον. In both passages I translate 'screen', as a differentiation from similar vocabulary elsewhere (*bursa*, *derma*), but in practice the material will be hide or leather, in accordance with the word's etymology (LSJ s.v.). Such safeguards are also mentioned in e.g. Thuc. 2.75.5 (protective screening for the wooden defensive wall at Plataiai, 429); Polyaen. 3.11.13 (Chabrias equips his warships with side-screens); Apollod.Mech. 142.2 (part of the "grapevine"-tortoise to shield diggers; see Whitehead, *Apollodorus* 82–83 with fig.2).

With Ph.'s δέρρεις ... καταπετάσαι cf. δέρρεις κατεπέτασαν in Diod.Sic. 20.9.1 (on the Carthaginian practice of draping hides over the prows of their warships in bad times; see C4 under **ἢ ἐκ τῶν σχοινίων**).

In the subordinate clause, 'the bonds' (οἱ δεσμοί) do not introduce a new element in the construction but refer back in a more general way to the cables, ὁρμιστηρίαι; see under the preceding lemma. (This is not a term Ph. uses elsewhere in the treatise. In *Bel.* 70.28, 70.42, 72.10 and 78.15 they are iron components.)

C6.1–2 [*91.15–16*] **Ἀνθιστάναι δὲ χρήσιμον πρὸς ἕκαστον αὐτῶν δύο δεκαμναίους λιθοβόλους** ('(It is) useful to counter-position against each of the(se enemy rock-projectors) two ten-mina (4.37 kg.) stone-projectors'). Ph.'s phrase ἕκαστον αὐτῶν does refer back to the enemy *petroboloi*. Though they have not been expressly mentioned since C3.1–2 [*91.3–4*], the ambiguous ὑπὸ τῶν βελῶν of C5.4 [*91.14*] has kept the topic in view, and the *petroboloi* themselves will now feature

in the instructions about how precisely the defenders should employ their own counter-artillery: see the next lemma.

For counter-positioning (ἀνθιστάναι) artillery see again at D17.8–10 [*98.11–13*], from the attackers' standpoint: πρὸς τοὺς ἐκείνων λιθοβόλους δύο δεκαμναίους πρὸς ἕκαστον καὶ πεντασπίθαμον ἀντιστήσας.

A ten-mina (4.37 kg.) stone-projector, specified in these two passages (and also, periphrastically, in C26.1–2 [*93.1–2*]: Δημοσίᾳ τε εἰς ἕκαστον ἄμφοδον δοτέον ἐστὶν λιθοβόλον δέκα μνῶν), is a size that Ph. has mentioned, as the smallest he recognizes, in a theoretical context (*Bel.* 51.36, 51.49, 52.3). The fact that it is not otherwise attested in recommendations for use – or indeed in actual use – in literary sources must be purely accidental, given the surviving "shot" from Rhodes, Carthage and elsewhere: see Garlan 376 n.6*a*; D.B. Campbell, *Artillery* 18–22; Rihll, *Catapult* 291.

C6.2–5 [*91.16–19*] **οὓς δεῖ μεταφέρειν οὗ ἂν καὶ οἱ πολέμιοι κινῶσί τινα τῶν πετροβόλων, ἵνα ἂν δύνῃ ἀνταφεὶς συντρίψῃς πατάξας τὸ ὄργανον** ('which it is necessary to transfer to wherever the enemy may move one of their rock-projectors, in order that by return fire you may, if you can, strike the engine and crush it.'). The sense of this is clear, despite some textual corruption in the second clause. (Out of δύνηταιφεῖς (P) and δύναναι φεὶς (V) Graux conjured δύνῃ ἀφείς, but δύνῃ ἀνταφείς (Buecheler ap. Schoene) has become the standard solution. The doubly compound verb ἀνταφίημι is very rare and not otherwise attested in this concrete military sense, but Pollux 9.107 registers its application to throwing back a ball.)

C7 [91.19–24]: tactics against mining

C7.1 [*91.19*] **Πρὸς δὲ τὰς μεταλλεύσεις** ('Against mining operations'). The likelihood of mining/tunnelling by the attackers has been acknowledged as early as A1.6–7 [*79.6–7*] – see the Comm. thereto, under **μηδ' ὑπορύττηται** – and μεταλλεύσεις is Ph.'s one-word term for it here. Though the usage is rare in this non-metallurgical application, see Joseph. *AJ* 14.475 on Herod at Jerusalem in 37 (ὑπὸ γῆν τε ἁπαντῶντες ἐν ταῖς μεταλλεύσεσιν διεμάχοντο; overlooked by LSJ s.v.). Ph. will continue the analogy in D30 [*99.11–13*], Δεῖ δὲ καὶ ταῖς ὑπορύξεσι τῶν τείχων λαθραίως χρᾶσθαι καθάπερ καὶ νῦν χρῶνται <οἱ> μεταλλεύοντες, and in D32 [*99.18–19*], καὶ καπνιστέον τοὺς ἐν τοῖς μετάλλοις ὄντας. Compare also e.g. Diod.Sic. 18.70.5 (Polyperchon at Megalopolis in 318: διὰ τῶν μεταλλευόντων ὑπορύξας τὰ τείχη) and Polyaen. 7.11.5 (Darius I at Chalkedon in c.513: ἤρξαντο μεταλλεύειν ὑπόνομον οἱ Πέρσαι).

C7.1–4 [*91.19–22*] **ὀρυκτέον ἐστὶν ἀνὰ μέσον τοῦ τείχους καὶ προτειχίσματος ἱκανὴν τάφρον ἰσηλικὴν κατὰ βάθος τῶν θεμελίων τῷ κατὰ γῆς** ('an ample trench is to be dug in the middle of (the space between) the wall and an outwork, equal in size to the depth of the foundations below ground'). Methods of countering hostile mining are advocated, with anecdotal illustration, in Aen.Tact. 37.1–7; cf. e.g. Liv. 23.18.9 on the attempted defence of Casilinum against Hannibal in 216 (*transversis cuniculis hostium cuniculos excipere*); and unsurprisingly the topic in

general is not overlooked by the Byzantine theoreticians. See *Par.Pol.* 212.6–10 (11.24–29 Sullivan), from the attackers' perspective, and especially Syrianus Magister 13. The latter has echoes of the present passage of Ph., notably οὐκ ἔλαττον ἢ δέκα πήχεις ἀποστάντες τοῦ τείχους ποιήσομεν τάφρον τῷ τείχει παράλληλον, τὸ δὲ βάθος αὐτῆς ὁπόσον ἂν ᾖ τὸ βάθος τοῦ ὑπὸ γῆν οἰκοδομήματος τοῦ παρακειμένου τείχους· ἀνάγκη γὰρ καταλαβεῖν τοὺς ὑπορύττοντας (13.31–34). The appended clause there expresses more briefly the one in Ph., ἵνα φανεροὶ γινόμενοι οἱ ὑπορύττοντες ῥᾳδίως διαφθαρῶσι καὶ μηκέτι τῷ τείχει πλησιάζωσιν. The phrase 'parallel to the wall' is a helpful elucidation of what Ph. meant (and is also in Polybius: see below), but positioning the trench 'no less than ten cubits [4.62 m.] away from the wall' goes beyond anything Ph. specifies.

The sketch at Diels-Schramm 52 fig. 25 is cited by Winter, *Fortifications* 275 n.18, when he remarks that '[p]resumably this trench would have been dug in the bed of the inner ditch' (i.e. as described at A69–78 [*84.43–85.35*]). For clarity, 'an outwork' might have been more exactly expressed as the first such *proteichisma*. (Garlan 376 n.7*a*, alternatively, imagines this anti-mine *taphros* as additional to the previously mentioned three, 'creusé dans le glacis situé au pied de la muraille'.)

In actual siege-narratives, a response not unlike the ones recommended here was adopted by the defenders of Ambrakia against the Romans in 189 (Plb. 21.27–28, at 21.28.7–10), but with one significant difference there: the defensive trench was *inside* the wall (ἔσωθεν in Plb. 21.28.7, *intra murum* in Liv. 38.7.7; on the other hand Polybius's παράλληλον τῷ τείχει and Livy's *e regione eius operis quod vineis contectum erat* seem to be 90° at odds with each other).

C8–13 [91.25–47]: tactics against stoas

C8.1 [*91.25*] **Πρὸς δὲ τὰς στοὰς [καὶ τὰ μηχανήματα]** ('Against stoas [and machines]'). On stoas see generally A50 under **τὰς προσῳκοδομημένας**. (The present material takes up the distinction, noted there, between mobile and stationary ones.) But are 'machines' – by which Ph. usually means mobile siege-towers and the like: see General Introduction C.ii.*b* – also mentioned here? Though Diels-Schramm 53, Garlan 307 and Lawrence 91 all see no problem, evidently, I believe that Schoene was right to delete the phrase. Both explicitly (at C9.4 [*91.31*]) and implicitly, C8–13 [*91.25–47*] address the threat from stoas; not until C14.1 [*91.47*] does the focus shift to 'machines' (etc.).

C8.1–4 [*91.25–28*] **<εἰς> σωλῆνα ἀπό του ἔνδοθεν μηχανήματος ἢ πύργου ἐκταθέντα ἐμβάλλειν ἔσω τριτάλαντους λίθους** ('(it is necessary) to place three-talent (78.6 kg.) stones inside a pipe which has been extended from some machine within or a tower'). A stone of this weight is that fired by the largest stone-projector recognized by Ph. in *Bel.* 51.34–44 (at 44). See also Diod.Sic. 20.48.3 (*tritalantoi petroboloi* are the largest ones mounted on the helepolis brought against Cypriot Salamis by Demetrius Poliorcetes in 307); Moschion FGrH 575 F1.4 ap. Athen. *Deipn.* 5.208C (this is the calibre of the lithobolos installed by Archimedes on the massive superfreighter *Syrakosia* built for Hieron II of Syracuse: Casson, *Ships*

191–199); and cf. also Athen.Mech. 27.5–6 (the helepolis designed by Epimachus of Athens for Demetrius to use against Rhodes 'withstands a blow up to that of a three-talent stone'; discussion in Whitehead and Blyth, *Athenaeus* 136–137).

Here and in the continuation in C9 (see the next lemma) I have followed Lawrence 91 in translating Ph.'s σωλήν as 'pipe', but that need not imply something fully tubular. Diels-Schramm 53 have 'Rinne', and Garlan's term (307, 308, 378 fig.64) is 'gouttière'.

This pipe protrudes 'from some machine within or a tower'. (I accept here Schoene's tentative conjecture του for τοῦ.) The second of these terms is ambiguous. If it means one of the wall's structural towers, in accordance with the predominant sense of πύργος elsewhere in the treatise, that maximizes the contrast between the μηχάνημα and the πύργος; and to corroborate such an interpretation, the scope of 'within' (ἔνδοθεν) would need to be restricted to the μηχάνημα. By a combination of phraseology and punctuation, Diels-Schramm 53, Garlan 308 and Lawrence 91 all do restrict it so, and on balance I am content to agree. (The alternative would be to take ἔνδοθεν with both nouns, employed by Ph. semi-tautologously for a mobile tower or similar construction.) Assuming, then, that the pipe is mounted either on a mobile wooden tower (just) inside the wall or else on a stationary tower that forms part of the wall itself, there would seem to be advantages and disadvantages to both modes of deployment – the first sacrificing reach for height, the second *vice versa*.

See further under the next three lemmata.

C9.1–3 [*91.28–30*] **ἐπ' ἐσχάτῳ δὲ ὁ σωλὴν ἐχέτω ἑκατέρωθεν γιγγλυμωτὰς σανίδας συγκλειομένας καλῳδίοις** ('let the pipe have at its (outer) end, on each side, hinged planks tied together with cords'). These specifications, and their elaboration in C9.3–6 [*91.30–33*], create a reasonably satisfactory picture of this (unique) device as a whole: see Diels-Schramm 53 fig.26, reproduced as Garlan 378 fig.64 (and in D.B. Campbell, *Warfare* 50). I would query only their assumption that the outward extension of the pipe is absolutely horizontal; rather, it would surely have to incline downwards somewhat, for gravity to release the stone – there being no stated means of propulsion – when the two hinged planks (γιγγλυμωτὰς σανίδας) open, jaw-like, to allow this.

On καλῳδία, again at the end of the sentence (below, under **πάλιν**), see A37 under **ὑπὸ τῶν**. The terminology Ph. uses here is otherwise of no particular note, save for the adjective γιγγλυμωτός. Its only other relevant occurrence is in Apollod. Mech. 189.9 (actually in one of the extensive post-Apollodoran expansions of the original: so Whitehead, *Apollodorus* 132–136) and in the reproduction of that passage in *Par.Pol.* 272.6–7 (= 55.9 Sullivan): an assault-raft for crossing rivers has a hinged wooden rampart (προτείχισμα ξύλινον γιγγλυμωτόν).

C9.3–4 [*91.30–31*] **ὧν χαλασθέντων καὶ πιεσθεισῶν τῶν σανίδων ὀλισθηρὸς <ὁ λίθος> ἐπιπεσεῖται ἐπὶ τὰς στοάς** ('when these (cords) have been loosened and the planks have been squeezed, <the stone> will slip and fall onto the stoas'). The paradosis here has been found faulty; I accept Diels's solution (printed in Diels-Schramm 54 and Garlan 308), which builds on that of Brinkmann ap. Schoene: the odd phrase ὅλος ὁ λίθος is removed from its transmitted place in the following clause (see the next lemma) and becomes ὀλισθηρὸς ὁ λίθος here. Though Ph.'s stone will not become 'slippery' in the literal sense that the ones in e.g. Xen. *Anab.* 4.3.6 are, the transferred application is acceptable enough.

For ὧν χαλασθέντων cf. Apollod.Mech. 187.3 (interpolated: Whitehead, *Apollodorus* 120), χαλασθέντων τῶν κατὰ νώτου σχοινίων. The verb χαλᾶν in this sort of context found its way into technical Latin: see Veget. 4.23 (*adversum arietes ... aliquanti centiones et culcitas funibus chalant*).

C9.5 [*91.32*] **πάλιν τῶν καλῳδίων συγκλεισθέντων** ('when the cords have been tied together again'). Strictly speaking it is the planks that are tied together again, with the cords (cf. C9.2–3 [*91.29–30*], σανίδας συγκλειομένας καλῳδίοις); even so, the meaning is clear, and there is no need for τῶν καλῳδίων <συνταθέντων καὶ τῶν σανίδων> συγκλεισθεισῶν (Brinkmann ap. Schoene).

C10.1–3 [*91.33–35*] **Ὡσαύτως δὲ ἀπὸ τῶν μηχανημάτων καὶ ἀπὸ κεραίων λίθους μεγίστους ἀφιέντας** ('Similarly, by releasing very large stones from the machines and from cranes'). Unlike the three-talent stones just mentioned (and the one-talent ones about to be mentioned), these modes of delivery can use stones whose 'very large' size does not need, evidently, to be quantified.

Releasing such stones from 'machines' – if that is what Ph. wrote – must somehow be differentiated from what C8.2–3 [*91.26–27*] has said about the extension of the pipe ἀπό του ἔνδοθεν μηχανήματος ἢ πύργου. Precisely in what the differentiation consists is unclear, however; and we might wonder what range a (pipe-less) 'machine' situated inside the wall could command. By contrast, the 'cranes' (again at D48.2 [*100.18*]) have not been previously mentioned, and their deployment can be readily visualized from references to them elsewhere. See e.g. – in defensive use – Thuc. 2.76.4 (Plataiai), Plb. 8.5.8–10 and 8.6.2 ("Archimedean" Syracuse; cf. Plut. *Marcell.* 15.2), Plb. 21.27.4 (Ambrakia), Arr. *Anab.* 2.19.2 (Tyre).

There is a clear echo of this passage of Ph. in *de obsidione toleranda* 14: ἔτι δὲ καὶ κεραίας δυναμένας λίθους βαρεῖς πρὸ τοῦ τείχους ἀπὸ τῶν ἐπάλξεων ῥίπτειν (and cf. 150: λίθους βαρεῖς ἐπαφιέναι κατὰ τοῦ κριοῦ).

C10.3–4 [*91.35–36*] **τοῖς πετροβόλοις ἄνω βάλλοντας [τοῖς παλιντόνοις καὶ τοῖς μοναγκῶσι]** ('firing upwards with rock-projectors [both palintone and one-armed]'). The point of firing upwards is elucidated by Lawrence 90: it is 'so that the missiles fall almost vertically at the end of the trajectory'.

On 'palintone', literally back-sprung, see in brief Marsden, *Development* 23; Whitehead and Blyth, *Athenaeus* 77; Campbell, *Artillery* 16. The fact that neither this term – a technical one in relation to catapult design – nor its counterpart euthytone had been used by Ph. in *Bel.* (contrast Hero, *Bel.*74.5–9 and *passim*) might not in itself constitute sufficient grounds for rejecting its occurrence here; nevertheless experts have been rightly troubled by an apparent mention of *monagkones*, a.k.a. onagers (Marsden, *Development* 189–198, *Treatises* 249–265; Landels, *Engineering* 130–132), so long before they are referred to again (in Apollod.Mech. 188.6–9 – and even there in material very likely to be a later addition: so Whitehead, *Apollodorus* 120). The whole phrase has the appearance of an intrusive gloss on τοῖς πετροβόλοις; I follow Lawrence 90 in rejecting it.

C10.4–6 [*91.36–38*] **διὰ δὲ τῶν καταξύρων θυρίδων τῶν ταλαντιαίων λίθων κάτω ἀφιέντας** ('and also when releasing one-talent (26.2 kg.) stones downwards through the shaved-off windows'). As transmitted, these windows are καταξήρων, an adjective Ph. has used of trenches at A36.2 [*82.29*], but 'bone-dry' makes no sense here. The correction to καταξύρων is by Miller (see A15 under **ἀπὸ τῶν**). Such windows have already been mentioned at A20.4–8 [*81.9–13*]; see the Comm. thereto.

C11.1–3 [*91.38–40*] **Ἐκ δὲ τῶν ἐπὶ τῇ στέγῃ κειμένων κατὰ μέτωπον τύπτοντας <ἢ> ἐκ τῶν πλαγίων καταβάλλειν αὐτάς** ('Also (it is possible) to destroy them by striking them, frontally or laterally, (with blows) from the (machines) placed on the platform'). My translation 'platform' is borrowed from Garlan 308, to which 378 n.11*a* supplies a question and a comment: '[D]e quelle plate-forme s'agit-il? Sans doute à la fois de celle des courtines et de celles des tours, dont certaines devaient, en ce cas, être privées de toits'. Likewise (on that matter) Lawrence 91: 'also throw down (stones) that are lying on top (of your tower or curtain)'.

With this passage of Ph. in mind, Maier 2.84 cited the three passages from Herodotus (1.178.2, 2.124.5, 9.15.3) that are also cited (*inter alia*) by LSJ s.v. μέτωπον, II.1. Closer parallels, though, are ones which use Ph.'s actual phrase κατὰ μέτωπον. See e.g. Diod.Sic. 17.87.4 (Porus's "frontage" of elephants drawn up κ.μ.), 18.45.2 (Antigonus's elephants attack the army of Alcetas κ.μ.), 18.71.3 (defending access to Megalopolis against Polyperchon, Damis places no troops κ.μ. but a mass of javelin-throwers, archers and catapulteers ἐκ τῶν πλαγίων), and Arr. *Anab.* 1.21.6 (at Halikarnassos the defenders fire at Alexander's mêchanai 'not only κ.μ. but also out of the towers that had been left standing on either side of the breached wall, which made it possible to fire both ἐκ πλαγίου and almost from behind').

C12.1–3 [*91.40–42*] **Ἐὰν δὲ ὦσιν ἐκ γέρρων πεποιημέναι, καὶ τοὺς πυροφόρους εἰς αὐτὰς ἀφεῖναι** ('If (such stoas) are made out of wicker, discharge your incendiaries into them too'). The meaningless paradosis ἐκ πύρρων was adjusted by Schoene to ἐκ πύργων, no improvement. The standard emendation to ἐκ γέρρων (Buecheler ap. Schoene, suggesting either this or – on the basis of Hesychius γ 443: γέρρα· τὰ ἀπὸ καλάμων ἢ παπύρων ἐργαστήρια – ἐκ παπύρων) is not only attractive *per se* but derives support from Ph.'s other mentions of wicker in the context of constructing stoas and tortoises: D36.1–2 [*99.29–30*], D51.1–6 [*100.25–30*], and see A50 under **τὰς προσῳκοδομημένας**.

Ph.'s advice here belongs in the broad tradition represented by Aen.Tact. 33.1: 'when the enemy have brought up tortoises you should pour pitch and throw oakum and sulphur over them and then drop onto them a burning bundle of sticks tied to a rush rope. Materials of this kind, suspended outwards from the wall, can also be thrown on to machines as they are being brought forward' (Χρὴ δὲ ταῖς προσενεχθείσαις χελώναις ἐπιχεῖν πίσσαν καὶ στυππεῖον καὶ θεῖον ἐπιβάλλειν, ἔπειτα φλογωθέντα φάκελλον καὶ ἐξάψαντα ἐπαφιέναι σχοίνῳ ἐπὶ τὴν χελώνην. Τὰ δὲ τοιαῦτα προτεινόμενα ἀπὸ τοῦ τείχους ἐπιβάλλεται τοῖς προσαγομένοις μηχανήμασι). Diod.Sic. 14.51.2 describes this tactic being used by the defenders of

Motya against Dionysius I in 397; those besieging Athenocles in Polyaen. 6.3 (cf. B52 under **μόλιβον**) are said to have protected their tortoises from fires caused by 'both the lead and whatever else was thrown burning from the walls'; and for further instances see e.g. Diod.Sic. 20.48.6–7 (Cypriot Salamis) and 20.96.6–97.2 (with Garlan 242 n.7: Rhodes).

'Incendiaries' (πυροφόροι) will reappear at C41.1–2 [*94.8–9*] C58.3–4 [*95.19–20*], D49.1 [*100.20*] and recommended for use by the attackers in D104 [*104.19–21*]. (In C58, as noted by LSJ s.v. 1, sense and context might strictly require the word to refer to the machines – catapults – which discharge the incendiaries; as with analogous vocabulary, though, little hinges on the point either way.)

C12.3–4 [*91.42–43*] **καιρὸν δὲ λαβὼν ἐκπέμψας στρατιώτας ἔμπρησον** ('and take an opportunity to send out troops and set fire to them'). This might be the best approach if the stoas (vel sim.) were some distance from the walls.

Sorties by defenders to burn enemy 'machines' – I cannot find an episode which matches Ph.'s *stoa*-terminology to a nicety – are recounted by e.g. Diod.Sic. 13.85.5 (Akragas against Dionysius, 406) and 14.108.4 (Rhegion against him, 388); and see also Arr. *Anab.* 1.22.1–2 (Halikarnassos against Alexander in 334: there is an ἐκδρομὴ … πανδήμει ἐκ τῆς πόλεως, with some people throwing on to the *mêchanai* 'torches and whatever other items would start a fire and provoke a conflagration').

C13.1–3 [*91.43–45*] **Ἐὰν δὲ ὦσιν ὀρυκταί, ὕδωρ θαλάσσης ἄνες εἰς αὐτὰς τοῖς περιάκτοις τροχοῖς <ἢ> ἐὰν ἄλλον τινὰ δύνῃ τρόπον** ('If they are dug in, release seawater into them with rotating (water-)wheels, or by any other means you can'). Ph.'s assumption (without a clause of the 'if it is available' type, as in D5.2 [*96.38*]) that his city does have ready access to seawater is notable; cf. General Introduction D.ii.

On these *periaktoi trochoi* see J.P. Oleson, *Greek and Roman Water-Lifting Devices: the history of a technology* (Toronto, Buffalo & London) 83–84, visualizing them as wheels compartmentalized in either the body or the rim. On the apparent tautology of a rotating or revolving wheel, his comment is: 'the juxtaposition may either constitute technical vocabulary or be meant to clarify the mounting of the wheels in a narrow frame rather than on a long axle. The adjective may also appear to emphasize their continual rotation. The description could fit either kind of wheel [mentioned above], but notice should be taken of Vitruvius's comment that the low lift and high output of the *tympanum* (wheel with compartmented body) make it suitable for use in salt-pans (10.4.2)'. For *periaktos* in this context cf. Ctesias FGrH 688 F34b (ap. Plut. *Mor.* 974E): cows irrigate the royal gardens at Susa περιάκτοις ἀντλήμασιν.

In Ph. himself the adjective appears again at D10.4–7 [*97.22–25*], τά τε μηχανήματα ἵστα ὑπότροχα καὶ περίακτα κατασκευάζων; see the Comm. thereto.

C13.3 [*91.45*] **τῷ ἐνετῆρι** ('with the blower'). Again, in the plural, in D48.2 [*100.18*]. Outside these two passages in Ph. the noun is only attested in medical writers, where it means a syringe used for administering enemas (LSJ s.v. I).

Garlan 379 n.13*d* considers it, *qua* large item of military hardware (LSJ s.v. II: 'siege engine of war for hurling projectiles'), an enigma. Others, very plausibly in my view, have visualized it as a flame-thrower ('Flammenwerfer (Ölspritze)': Diels-Schramm 54; cf. Lawrence 90; Rihll, *Catapult* 161). If so, its most celebrated antecedents go back to the second half of the 420s: the device successfully deployed by the Boiotians against Delion (Thuc. 4.100.1–4) and, more briefly described, the one brought by Brasidas against Lekythos, Torone (Thuc. 4.115.2–3, which uses the phrase πῦρ ἐνῆσειν). See generally Marsden, *Development* 51; Garlan 140–141.

C14–17 [91.47–92.22]: tactics against 'machines', rams and boarding-bridges at close range

C14.1–3 [*91.47–49*] **Πρὸς δὲ τὰ μηχανήματα ὅταν ἐγγὺς ᾖ, καὶ τοὺς κριοὺς καὶ τὰς ἐπιβάθρας** ('Against machines when they are close, and rams and assault-bridges'). Ph. now turns from stoas to three other categories of mechanical danger to the defenders: 'machines' (= mobile towers), *krioi* and *epibathrai*. On the second of these see A3 under **καὶ ἵνα**. Assault-bridges, not hitherto mentioned, recur at C14.8–9 [*92.3–4*], C59.5–6 [*95.24–25*], C65.4 [*95.42*] (the variant *diabathra*: W.M. Murray, *Age of Titans* 294 n.32 makes an unconvincing attempt to find a substantive difference), D25.3 [*98.44*], D34.2 [*99.22*] and D45.2 [*100.12*]; see generally Whitehead and Blyth, *Athenaeus* 89.

C14.3–4 [*91.49–50*] **πρῶτον μὲν κατὰ τοῦτον τὸν τρόπον ἐπᾶρσαι τὸ τεῖχος** ('first raise the wall in this manner'). Rochas d'Aiglun's emendation to κατὰ τοῦτον τὸν τόπον, 'at this place', was printed by Schoene, and also tacitly endorsed by Marsden, *Development* 124–125, in his translation of this passage ('raise the wall at this point'); otherwise it is orthodox to accept the paradosis.

C14.4–7 [*91.50–92.2*] **<μὴ> καθελόντας τοὺς προϋπάρχοντας προμαχῶνας, ἀλλ' ἐπ' αὐτῶν τῆν οἰκοδόμησιν πεποιημένους καὶ ἄλλους ἄνωθεν κατασκευάσαντας κατάστεγον ποιῆσαι ταύτῃ τὸ τεῖχος** ('do not remove the existing battlements but create the building-process upon them and, by having others on top, make the wall covered at that place'). On 'battlements' (again later in this chapter; also C23.2–3 [*92.41–42*] and D73.8 [*102.19*]) see A8 under **τὰς ἐπάλξεις**. Elsewhere the term occurs in this sense several times in Herodotus (1.98.4–6, 1.164.1, 3.151.1), in Xen. *Anab.* 7.8.13, and in Maier no.65 (SEG 35.1151: building-accounts from Teos, turn of third/second century) lines 4–9: ἐπω<ι>κοδομήθη|[σαν] τούτου μὲν τοῦ πύργου καὶ τοῦ | [προ]σεχέος αὐτῶι τείχους δόμοι ('courses') ἕξ, | [το]ῦ δὲ ἐχομένου πύργου δόμοι ἓ[ξ] καὶ | [το]ῦ προσεχέος αὐτῶι τείχους δόμοι | [τέσ]σαρες καὶ προμαχῶνες τέσαρες.

Ph's introductory phrase at C14.2 [*91.48*], 'when (the machines etc.) are close', has created a misleading impression, we now see, of the scope of the response that he is recommending. To raise and elaborate the wall in such a way could not usually have been a task done in haste and under pressure when an enemy attack was in full swing (Josephus's successful accomplishment of this at Iotapata in 67 CE is presented as something surprising and exceptional: see *BJ* 3.171–175); rather, it must almost always have been an advance preparation, undertaken at those points in the circuit deemed most vulnerable. As to the procedure itself, Marsden, *Development* 124–125 (at 125 n.1) and, independently, Garlan 379 n.14*c* are in agreement that the floor of the upper battlements (and walkway) becomes the roof of the lower one. Marsden adds that a roof for the upper ones as well is 'just possible', though not a necessary assumption.

Whatever the case with that detail, the overall point – again made independently by both Garlan and Marsden – is that Ph.'s scheme of double battlements (ὅπως ἂν ὑπάρχωσί τε διπλοῖ), though paralleled at second-century Perge and Side, was not the dominant model of the era, and is advocated here on an emergency basis only (πρὸς τὴν χρείαν).

Simpler-sounding approaches to raising the height of a wall at a vulnerable point are summarized in Veget. 4.19: *partum muri, ad quam machina conatur accedere, caemento atque lapidibus vel luto sive lateribus, postremo tabulatis extruendo faciunt altiorem.*

C14.8–10 [*92.3–5*] **ὅπως, ἐὰν [πρὸς] τὴν ἐπιβάθραν ἐπιβάλλωσι, κάτωθεν ῥᾳδίως διὰ τῶν προμαχώνων ἐμπρήσωμεν αὐτήν** ('in order that if they do deploy the assault-bridge we may easily set it on fire from below through the (lower) battlements'). Perhaps by throwing on torches or the like, if the *epibathra* truly was close enough to the wall; alternatively by the mechanical means mentioned earlier, incendiaries (C12.2–3 [*91.41–42*]) or the blower (C13.3 [*91.45*]).

C14.10–13 [*92.5–8*] **ἄν τε τοὺς ἄνωθεν προμαχῶνας ἀποκόπτωσι, κρίκους καὶ βρόχους προσάγοντες ἐκ τῶν κατὰ τοὺς <κάτω> προμαχῶνας ὄντων διαστημάτων εὐχερῶς <πα>τάξωμεν αὐτούς** ('and were they to sever the battlements above, we would readily afflict them by deploying rings and nooses out of the gaps there are in the battlements <below>'). Lawrence 91 translates the final verb here as 'get them into position', which reveals that he (tacitly) retains the transmitted τάξωμεν; otherwise Schoene's ingenious conjecture <πα>τάξωμεν has become standard. (The verb does not have to imply striking in the sense of literal, hard physical contact: note LSJ s.v. II.c., 'afflict, visit', adducing Septuagint *Deut.* 28.28, πατάξαι σε Κύριος παραπληξίᾳ καὶ ἀορασίᾳ καὶ ἐκστάσει διανοίας, and in fact instances of this figurative 'smite' sense in the Septuagint are plentiful.)

For nooses see A51 under **βρόχους**. In the present passage the transmitted noun paired with them is rams (κριοὺς καὶ βρόχους); however, the general problem of Ph.'s apparent allusions to defensive rams has already been aired at A50 under **ἐκ τοῦ πλαγίου**, and now, specifically, such a thing creates a nonsensical scenario: that of the besiegers somehow using rams from an elevated position on the battlements. A specific tactic involving a counter-ram deployed at ground level will be adumbrated at length in C15–17 [*92.8–22*], but here, first, this passing mention of *krioi* in the plural is intolerable. My emendation to κρίκους borrows that of Buecheler (ap. Schoene), now orthodox, at D48.3–4 [*100.19–20*].

C15.1–4 [*92.8–11*] **Ἐκτρυπήσαντες <δὲ> [αὐτοὺς] ταύτῃ καὶ τὸ τεῖχος κατὰ τοὺς ἁρμόζοντας τόπους, κορμοὺς κατασκευάζωμεν κατὰ τὰς θυρίδας περιτρέχοντας** ('When we have also bored out the wall here at appropriate places, we should prepare in the windows logs that (can) rotate'). No matter whether this is regarded as a continuation of the previous sentence (Diels-Schramm, Lawrence) or the beginning of a new one (Schoene, Garlan), the topic has shifted to something new. Access to the enemy hardware – whatever it may be: see the next lemma – which has previously been sought via the existing gaps in the <lower> battlements (ἐκ τῶν κατὰ τοὺς <κάτω> προμαχῶνας ὄντων διαστημάτων: C14.12–13 [*92.7–8*]) will now be attained through new, purpose-drilled apertures. (The rare verb ἐκτρυπᾶν is used again at C60.2–4 [*95.26–28*], of covertly piercing the hulls of enemy ships; see the Comm. thereto.)

For logs (*kormoi*) see e.g. Hdt. 7.36.4 (κορμοὺς ξύλων καταπρίσαντες), App. *BC* 1.112 (τὰ τείχη ξύλων κόρμοις ὑποκρεμάσαντος), and generally LSJ s.v. Ph.'s participle which indicates their capacity to rotate, περιτρέχοντας, is repeated in C16.4 [*92.18*] (περιτρεχόντων τῶν κόρμων), and cf. the rotatable (?)buoys (<χῶναι> περιτρέχουσαι) of C52.3 [*94.42*].

C15.4–8 [*92.11–15*] **τῷ κριῷ τῷ ἀντισκευασθέντι τούτοις τύπτοντες ἄνωθεν τῆς ἐσχάρας τὸ μηχάνημα καὶ τὸν κριὸν καὶ τὸν τρύπανον καὶ τὸν κόρακα καὶ ὃ ἂν προσάγωσι, συντρίβωμεν ἀχαλέπως** ('by striking at these above the platform, with the ram that has been prepared as a counter(-weapon), we should crush the machine and the ram and the drill and the raven, and whatever they may deploy, without difficulty'). The adverb ἀχαλέπως is a *hapax legomenon*.

The original 'machines … and rams and assault-bridges' (C14.1–3 [*91.47–49*]), having first been reduced to the third of them only (C14.8–9 [*92.3–4*]), now expands again into a scenario in which any and every species of enemy attacking hardware can be countered. For the 'drill' (*trupanon*) see also D25.2 [*98.43*], the Comm. to D48.1 [*100.17*], and generally Whitehead and Blyth, *Athenaeus* 87–88, 174–175, and index s.v. For the 'raven' (*korax*) see also D25.2 [*98.43*], D48.1–2 [*100.17–18*], and generally Whitehead and Blyth, *Athenaeus* 88–89 and index s.v.

This *krios antiskeuastheis* sounds in broad terms like the *antikrios* (a term otherwise unattested) recommended in Aen.Tact. 32.7: 'here is the best thing to prepare against against attempts to breach the wall. When you know the point against which the attack is directed, you should get ready a counter-ram on the inside of the wall at that point and dig through part of the wall just as far as the outer layer of bricks, so that the enemy is not forewarned. Then, when their breaching-device is close at hand you deliver a blow from inside with the counter-ram; and the counter-ram is much the stronger of the two' (Ἄριστον δὲ πρὸς τὰ διακόπτοντα τὸ τεῖχος καὶ τόδε παρεσκευάσθαι. Ὅταν γνῷς ᾗ προσάγεσθαι τοῦ τείχους, ταύτῃ χρὴ ἔσωθεν ἀντιπαρασκευάζειν ἀντίκριον, διορύξαντα τοῦ τείχους μέχρι τοῦ ἄλλου μέρους τῶν πλίνθων, ἵνα μὴ προΐδωσιν πρότερον οἱ πολέμιοι· ὅταν δὲ ἐγγὺς ᾖ τὸ διακόπτον, οὕτως ἔσωθεν τῷ ἀντικρίῳ παίειν· καὶ πολὺ ἰσχυρότερον ὁ ἀντίκριος γίνεται). As well as explicitly envisaging that the walls will be of brick, this also seems to presuppose, accordingly, that τὸ διακόπτον which will be weaker than the *antikrios* is a drill rather than a ram: so Whitehead, *Aineias* 195 (following Winter, *Fortifications* 72 n.8); and cf. e.g. Rihll, *Catapult* 57, reasonably calling the tactic 'highly risky' nonetheless.

What Ph. has in mind, with its pre-prepared 'windows', would at least allow the defenders a glimpse of what they are aiming at, but the details of his plan are opaque, despite the comment and expansion which will be appended in C16–17 [*92.15–22*]; see under the next two lemmata. In the present sentence the chief obscurity is the phrase ἄνωθεν τῆς ἐσχάρας. Diels-Schramm 55 translate 'oberhalb des Gerüstes' and Lawrence 91 'above the sill', each without comment. LSJ s.v. ἐσχάρα classifies the present passage under its sense IV.1, *platform, stand, basis*, and associates it with Athen.Mech. 32.10 (ἐν τῇ ἐσχάρῃ τῇ ἐπερειδομένῃ ταῖς ὀλκάσιν) and Vitruv. 10.11.9 (*Basis, quae appellatur* ἐσχάρα; see also 10.41.1, *Basis compingatur, quae graece* ἐσχάρα *dicitur*). Ph. himself will use the word again, in the plural, at C53.1–2 [*94.43–44*], ἐσχάρας ἐπὶ τοῦ τόπου τίθεσθαι, of underwater platforms to block the entrance to harbours. I have therefore followed Garlan 309 and 380 n.15*c* (with general discussion at 227 and 229, and see also his *Index de mots grecs* at 406) in translating 'platform' here. Whether the word used is *eschara* or (never in Ph.) its diminutive *escharion*, it does refer, in contexts such as these, to the base/platform of ram-tortoises, helepoleis, and similar constructions. In the present passage, accordingly, the phrase ἄνωθεν τῆς ἐσχάρας belongs with the participle immediately before it, τύπτοντες; Ph.'s point is that, for best effect, that is where the counter-ram should strike any attacking engine.

C16.1–5 [*92.15–19*] **αἱ δὲ περιφερεῖς δοκοὶ τούτων ἕνεκα πλάγιαι παρὰ τὰ ἐκτρυπήματα τίθενται, ἵν' εὐχερῶς ὁ κριὸς ἔξωθεν τε καὶ πάλιν ἔσωθεν παραλαμβάνηται περιτρεχόντων τῶν κόρμων τὴν κίνησιν ὁποίαν οὖν νοεῖς** ('it is because of these that the rounded joists are placed horizontal beside the borings, in order that the (counter-)ram going out and back in again may readily match the motion of the logs as they move, whichever you so intend'). Ph.'s phrase τούτων ἕνεκα is distorted in Garlan's (309) translation 'telle est la raison pour laquelle', i.e. as anticipating the ἵνα clause. Rather, it looks retrospectively back to τὸ μηχάνημα κτλ. in C15.6–7 [*92.13–14*].

Though the vocabulary shifts again here, the 'rounded joists' must be the *kormoi* of C15.3 [*92.10*], and again here. And the main substantive point now clarified about them is that they are positioned – whether one or more per ἐκτρύπημα/θυρίς – *plagiai*: 'quer' (Diels-Schramm 55), 'transversalement' (Garlan 309), 'crosswise' (Lawrence 91). This fact, in conjunction with the further explanation in the ἵνα clause, creates a picture of the ram's shaft supported on one of the logs, thus contributing to the stability and power that C17 [*92.19–22*] regards as so essential.

C17.1–4 [*92.19–22*] **Κατασκευαστέα τέ ἐστιν αὐτῷ κριόστασις ὡς ἀσφαλεστάτη πρὸς τὸ τοὺς ὠθοῦντας αὐτοὺς καλῶς βεβηκότας ὡς σφοδρότατα συντελεῖν τὰς πληγάς** ('Also to be provided for is a ram-emplacement as secure as possible, with a view to giving the pushers themselves a good stance for completing their blows as vigorously as possible'). The term *kriostasis* (an analogue of *belostasis*, on which see A21 under **ἐν οἷς**) is a *hapax legomenon*.

For the verb ὠθεῖν used of pushing a ram cf. Plb. 9.41.4 (ὅ τε κριὸς ἐξωθεῖτο). On the idiom καλῶς βεβηκότας describing a firm or stable position see generally LSJ s.v. βαίνω, A.1.2.a.

With the phrase ὡς σφοδρότατα συντελεῖν τὰς πληγάς cf. C70 [*96.10–12*], Συμμεμέτρηται δὲ ταῦτα καὶ σφοδρότατα ταῦτ᾽ ἐστὶ πρὸς τὰς πληγὰς τὰ βέλη.

C18–27 [92.22–93.4]: precautionary and reactive tactics against a breach in the wall

C18.1–3 [*92.22–24*] **Ἀντοικοδομητέον τέ ἐστι καὶ ταύτῃ τρίγωνον τεῖχος <ἔσω> τὸ ἔμβολον ἔχον, δι᾽ οὗ θυρίδες ἑκατέρωθέν εἰσιν οὐκ ὀλίγαι ποιητέαι** ('Also to be built here is a triangular counter-wall – with the point <inwards> – through which plenty of windows are to be made on both sides'). The concept of a (limited-scope) counter-wall is already in Aen.Tact. 32.11–12: 'at any point where a tortoise has been brought up to enable the enemy to dig through or demolish part of the wall you must be ready with counter-measures. (12) Against a dig-through light a large fire, and against a collapse of the wall excavate an internal trench, to prevent their entering; and before the wall either collapses or is dug through build a counter-wall at the same time, if you cannot thwart them in any other way' (Ἡι δὲ ἂν τοῦ τείχους χελώνη προσαχθεῖσα δύνηταί τι τοῦ τείχους διορύξαι ἢ καταβαλεῖν, ταύτῃ χρὴ ἀντιοῦσθαι παρεσκευασμένον. (12) Πρὸς μὲν τὸ διόρυγμα πῦρ ποιεῖν πολύ, πρὸς δὲ τὸ πέσημα τοῦ τείχους τάφρον ἔσωθεν ὀρύσσειν, ἵνα μὴ εἰσέλθωσιν· καὶ ἅμα ἀνταείρειν <τειχίον> τειχίζοντα πρότερον ἢ πεσεῖν τὸ τεῖχος, ἢ διορύσσεσθαι, ἂν μὴ ἄλλως δύνῃ κωλύειν). Actual examples include Plataiai in 429 (Thuc. 2.76.3), Perinthos in 341 (Diod.Sic. 16.49.1), Perinthos in 341 (Diod. Sic. 16.74.3), Tyre in 332 (Diod.Sic. 17.43.3), and Ambrakia in 189 (Plb. 21.28.2). No narrative account describes any of them as triangular, but Ph.'s specification in that regard (depicted with a wealth of incidental detail in Diels-Schramm 56 fig.27) is echoed by Syrianus Magister 13.55–56: 'let the shape of the (counter-)wall be triangular, with one side missing; the wall being fought over makes that' (τὸ δὲ σχῆμα τοῦ τείχους ἔστω τρίγωνον μιᾶς λειπούσης πλευρᾶς ἣν ποιεῖ τὸ πολεμούμενον τεῖχος).

The transmitted τρίγωνον τεῖχος τὸ ἔμβολον ἔχον, though accepted by Schoene, is plainly unsatisfactory. Emmanuel Miller (see A15 under **ἀπὸ τῶν**) proposed ἐμβόλου <σχῆμα> ἔχον, citing the parallel of Apollod.Mech. 140.10 (a tortoise ἐμβόλου σχῆμα ἔχουσα), but <ἔσω> τὸ ἔμβολον ἔχον (Diels) has become the accepted solution.

The purpose of the numerous 'windows' (θυρίδες is the standard correction here, by Brinkmann ap. Schoene, of the paradosis πυλίδες) could have been guessed even if it had been left unexplained, but Ph. gives a full explanation anyway (C18.3–6 [*92.24–27*]); and cf. under the next lemma.

C18.5–6 [*92.26–27*] **ὑπό τε τῶν βελῶν καὶ τῶν στρατιωτῶν, ἔτι δὲ ὑπὸ τῶν πολιτῶν** ('by both the artillery and the troops, and also by the citizens'). The addendum is striking. Once the attackers are properly inside the city, "civil defence" responses by the *politai* (and others) will feature throughout the rest of part C of the treatise; here, though, we see them envisaged as front-line troops in their own right.

C19.1–3 [*92.27–29*] **Δεῖ δὲ καὶ βάλλειν ἐκ τῶν καρβατίνων λίθοις ὡς μεγίστοις τοὺς πλησιάζοντας τῷ τείχει** ('It is also necessary to strike those coming close to the (city) wall with stones as large as possible (thrown) out of leather-hides'). The manuscripts here have ἐκ τῶν καρβατιώνων, a *hapax legomenon* retained by Schoene (and tentatively registered in LSJ s.v.), but ἐκ τῶν καρβατίνων is the standard emendation, by Schneider, which brings the present passage into line with D66 [*101.31–35*] (q.v.). (The adjective is otherwise applied to footwear made of undressed leather: see e.g. Xen. *Anab.* 4.5.14 with scholion, and generally LSJ s.v.) Rihll, *Catapult* 161, toys with the idea of a *karbation*, as per the paradosis, but in my opinion her two options – a 'machine … a stone-thrower' or 'a rawhide shelter for artillery' – both go astray in failing to recognize the strong likelihood that the stones in question here are not being fired by artillery but manually thrown. (On such stone-throwing see further below, C25, under **ἀφοριστέον**; and for manual stone-throwing, apparently, by the attacking side see D66 under **ἐκ τῶν**.)

Given that the material is leather, Garlan 380 n.19*a* is probably wrong to equate these *karbatinai* with the 'baskets' of D47.2–3 [*100.15–16*].

C20.2–5 [*92.30–33*] **ἀποσπαστέον τέ ἐστιν τὴν τάχιστην τὰς πρώτας ὀροφὰς καὶ τὰς καθαιρέσεις ἀναιρετέον ἀποικοδομήσαντα τὰς ἑκατέρωθεν οὔσας <διόδους> τῶν πύργων** ('what is necessary, as quickly as possible, is for the nearest (house-)roofs to be torn off and the debris collected for barricading the <throughways> that there are on both sides of the towers'). Graux wanted to emend καθαιρέσεις to καταβάσεις but no-one else has objected to Ph.'s using a word which is normally singular and abstract (see LSJ s.v.) as a concrete plural. Further on in the clause, by contrast, it is self-evident that a feminine noun in the accusative plural needs to be supplied. Diels-Schramm 57 adopt Schoene's <πυλίδας>, posterns; the more general term <διόδους> is advocated by Garlan 382 n.20*b*, and (like Lawrence 93) I find this convincing.

My translation incorporates the explanation/expansion of 'roofs' given by Lawrence 93. (Garlan 380 n.20*a* envisages other, more complicated interpretations involving the structure of the wall itself.) It is common ground that πρώτας (literally 'first'), used of them here, does mean first to hand, closest-by.

'Barricading' (ἀποικοδομήσαντα) is a term with a wide range of attested applications, from entombing Regent Pausanias of Sparta in the Brazen House (Thuc. 1.134.2, Lyc. *Leoc.* 128) to damming a rural Attic charadra disputed between neighbours (Demosth. 55.5 and *passim*). Of directly military instances, the closest to the present passage are two in Polyaenus, both of them involving gestures of bravado which succeed in deterring an attacker. In 2.38.1 ('an anecdote of doubtful value': J. Oulhen in IACP 417) Onomarchus the Phocian, besieged in Elateia by Pelopidas and the Thebans in 374, leads out his forces, barricades the gates (τὰς πύλας ἀποικοδομήσας), and stands the women, children and elderly in front of them, behind the hoplites. In 7.30 the otherwise unknown Mempsis, facing 'Arrhibaeus'

(Arrhabaeus? Arrhidaeus?) in similar circumstances, does much the same at the gates of his own (unnamed) city.

C21.3–4 [*92.35–36*] **ἵνα ἔχωμεν τοῖς πύργοις ταύτῃ βοηθοῦντες κτείνειν τοὺς βιαζομένους αὐτούς** ('in order that here we may be in a position to defend the towers and kill the men overpowering them'). For βιάζεσθαι see again C23.7 [*92.46*], τοὺς εἰς τὰ ἄμφοδα βιαζομένους, C56.3–4 [*95.11–12*], ὅταν βιάζωνται τῶν μικρῶν τινες εἰς τὸν λιμένα, and D105.7–8 [*104.27–28*] ἐὰν τί που βιάζωνται (Buecheler, now standard: τε ὑποβιάζωνται mss, retained by Schoene); and cf. also C32.3–4 [*93.27–28*], ἐὰν … εἰσβιάζωνται οἱ πολέμιοι. The verb can equally well be transitive and intransitive (see LSJ s.v.); in the present instance it is taken to be the former by Diels-Schramm 57 ('damit wir den Türmen Hilfe bringen und die sie Erstürmenden töten können') and Lawrence 93 ('in order that we may here give aid to the (defenders of the) towers by killing those (enemies) who are overpowering them'); nevertheless Garlan 309 might be right to opt for 'afin que nous puissions par là secourir les tours et tuer ceux qui y pénètrent de vive force'.

C22.4–5 [*92.39–40*] **τυπτόμενοι τοῖς βέλεσι καὶ οὐκ ἔχοντες οὐδαμῇ ἀποχωρῆσαι ἀλλ' ἢ εἰς τὸ ὀπίσω πάλιν ἐργωδῶς** ('being struck by projectiles and having no way to withdraw except by arduously going back again.'). cf. A16 under **κυριεύσαντες**.

C23.1–3 [*92.40–42*] **Ἐπιθετέον δέ ἐστι καὶ ταῖς καθηκούσαις πρὸς τὸ τεῖχος οἰκίαις προμαχῶνας** ('Also, battlements should be placed on appropriate houses near the wall'). On battlements see generally C14 under **<μὴ> καθελόντας** (and A8 under **τὰς ἐπάλξεις**).

Given Ph.'s advice in A10 [*80.16–19*] to have the wall 'sixty cubits away from the houses', Garlan 382 n.23*a* must be right in supposing that the present passage's 'appropriate' *oikiai* are the ones which border the internal perimeter road.

Thuc. 4.69.2, using different terminology from Ph. (*epalxeis* rather than *promachônes*), mentions houses with battlements at Nisaia in summer 424 (αἱ οἰκίαι τοῦ προαστείου ἐπάλξεις λαμβάνουσαι αὐταὶ ὑπῆρχον ἔρυμα), and 4.115.1 describes something similar on the Lekythos promontory at Torone the following winter (οἱ δὲ Ἀθηναῖοι ἠμύνοντό τε ἐκ φαύλου τειχίσματος καὶ ἀπ' οἰκιῶν ἐπάλξεις ἐχουσῶν). See further Garlan 88–90.

C23.3–4 [*92.42–43*] **τοῖς ἀμφόδοις ἑκατέρωθεν πύλας κατασκευαστέον** ('gates should be provided for the amphoda at each end'). The amphoda are mentioned twice more in C23–24 [*92.40–48*] and again in C26 [*93.1–3*] and C30 [*93.11–23*], and their gates, specifically, at C30.12–13 [*93.22–23*].

See Introduction D.iii for a general discussion of amphoda. Garlan, 'Cités' 21–22 (reprised in Garlan 382 n.23*b* and 384 n.29*a*) draws attention to Hellenistic inscriptions from (e.g.) Smyrna and Stratonikeia which reveal the amphodon as the prime unit for civil defence; cf. Syll.[3] 961 (Smyrna) with commentary, and Jones, *Public Organization* 303 and 336. See also e.g. L. Robert, *À travers l'Asie Mineure* (Paris 1980) 152–154; J. Du Bouchet, 'Quartiers, îlots et rues: remarques sur AMPHODON', *RPh* 78 (2004) 43–55, esp. 45–46 on Ph.; S. Saba, '*Amphoda* in Hellenistic times: urban planning and philological interpretation', *AC* 77 (2008) 79–90.

C23.4–5 [*92.43–44*] **ἐκ τῶν πλαγίων τοίχων ὀπὰς ποιητέον, δι' ὧν κτλ** ('holes should be made (coming) out of the flanking (house-)sides, through which etc.'). As so often in Ph. the precise sense of *plagios* leaves scope for differing interpretations, but in this instance Garlan 382 n.23*c* makes the apposite comment: '[l']adjectif πλάγιος s'applique sans doute ici aux murs de maisons disposés perpendiculairement à la rue principale, en bordure de petites ruelles assez étroites pour que les moyens de défense mis en oeuvre s'avèrent efficaces'.

If Ph. is expressing himself with precision, he wants holes (*opai*) newly made for the purpose, rather than exploiting the ones that most houses would already have for ventilation and the escape of smoke (on which see generally V. Svoronos-Hadjimichalis, 'L'évacuation de la fumée dans les maisons grecques des Ve et IVe siècles', *BCH* 80 (1956) 483–506, at 485–492).

Through these loopholes, enemy troops who have forced their way in to the amphoda can be covertly attacked with the sort of long, pointed weapons now specified: τοῖς τε ἀκοντίοις καὶ τοῖς ζιβύναις καὶ τοῖς βουπόροις ὀβελίσκοις. For 'javelins' (*akontia*), a commonplace term, cf. *Bel.* 58.42 (and the verb ἐξακοντίζειν in C66.2–3 [*95.45–46*]). *Zibunai*, mentioned again at D31.4 [*99.16*], are viewed as hunting-spears by Diels-Schramm 57 and Lawrence 93; I have preferred the more neutral 'lances' (and cf. Garlan 319, 'épieux', with 383 n.23*e*) because authentic military use is attested in (e.g.) Diod.Sic. 20.33.6, even though in the circumstances Ph. is describing here "civil" items might well be pressed into military service. That, after all, is the construction one is bound to put on the use of 'ox-piercing spits', τοῖς βουπόροις ὀβελίσκοις (again as the substantive βουπόροις in D31.3 [*99.15*]). The deployment of such an implement in much the way that Ph. envisages is described in Xen. *Anab.* 7.8.14: 'the wall [of Asidates' stronghold] was eight earthen bricks in depth, but at daybreak it was breached; and as soon as the breach appeared someone from inside struck the thigh of the nearest man with an ox-piercing spit' (ὁ δὲ τοῖχος ἦν ἐπ' ὀκτὼ πλίνθων γηίνων τὸ εὖρος. ἅμα δὲ τῇ ἡμέρᾳ διωρώρυκτο· καὶ ὡς τὸ πρῶτον διεφάνη, ἐπάταξεν ἔνδοθεν βουπόρῳ τις ὀβελίσκῳ διαμπερὲς τὸν μηρὸν τοῦ ἐγγυτάτω).

See further below, C25, under **ἀφοριστέον**.

C24.1–3 [*92.46–48*] **καὶ τὰς ἐσταμένας οἰκίας πρὸς τοῖς εὐρυχώροις καὶ τοῖς ἀμφόδοις ἐγγιζούσας ὁμοίως κατασκευαστέον ἐστίν** ('and the houses which stand next to the open spaces and are close to the amphoda are to be provided for likewise'). The scope of 'likewise' might extend to everything that C23 [*92.40–46*] has covered, i.e. including the battlements. Garlan 383 n.24*b* in fact takes this for granted, probably correctly, though the possibility that Ph. might have only the loopholes in mind cannot be ruled out.

The neuter substantive τὰ εὐρύχωρα expresses the concrete embodiment of the concept of εὐρυχωρία which Ph. has invoked at A32.5 [*82.10*], πρὸς τὸ εὐρυχωρίαν

ἔχειν πολλήν. (Concrete <εὐρυχω>ρίαι probably do not feature in A30.3 [*82.4*]: see the Comm. thereto.) In Aen.Tact. 1.9 the *ochloi* (masses: misidentified by Garlan 383 n.24*a* as mercenaries) are to be assigned 'some to the agora, some to the theatre, the rest to the open spaces there are in the city, in order that, as far as resources allow, no public place is left empty' (τοὺς μὲν εἰς τὴν ἀγοράν, τοὺς δὲ εἰς τὸ θέατρον, τοὺς δὲ ἄλλους εἰς τὰς οὔσας ἐν τῇ πόλει εὐρυχωρίας, ἵνα μηδὲν ἔρημον ᾖ εἰς δύναμιν τῆς πόλεως); 2.1, however, immediately goes on to add that 'to avoid having to send troops to such εὐρυχωρίαι as serve no purpose, it is best to block them off by digging trenches and by making them as inaccessible as possible to those wishing to occupy them as a prelude to starting a revolution'; and 2.2 appends the instance of the Spartan response to the Thebans' incursion in 362, including barricading τάς τε εἰσβολὰς καὶ τὰς διόδους καὶ τὰ εὐρύχωρα τοῦ πολίσματος (Bettalli, *Enea* 218–219). Though Ph. is not, overall, as haunted as Aeneas by the threat of *internal* insurrection, he does, unsurprisingly, recognize the strategic and psychological importance of these key locations – the very sites invaders will try to secure first: see D71 [*102.3–8*].

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Hippodamus), 3.1279b2–4, 7.1329b36–38. Here Ph. uses this terminology, whether or not with awareness of its political and philosophical reverberations, but in any case with a purely pragmatic approach to what it might mean for the socioeconomic make-up of the polis, and (as Garlan 383 n.27*b* observes) for the categories of citizen included in or excluded from its army 'en temps normal'.

Ph.'s recommendation represented the exception rather than the rule. 'In most cities, citizens were expected to supply their own weapons. However, extraordinary situations might oblige a city to call on the less well off and provide them with weapons (a shield, a lance or sword, and a helmet). Sometimes weapons would be donated; otherwise they had to be obtained using public funds' (Chaniotis, *War* 116). For a relevant episode see Polyaen. 3.8: Archinos becomes tyrant of Argos (266–263) by exploiting an occasion 'when the Argives were making arms at public expense for all the citizens' (Ἀργείων ὅπλα ποιουμένων δημοσίᾳ πᾶσι τοῖς πολίταις); cf. Pritchett, *War* 3.249–250.

C28–29 [93.5–11]: guard-duty, patrolling and passwords

C28.1 [*93.5*] **Ἐκκοιτίας τε καὶ ἐφοδείας τὰς προσηκούσας ποιητέον** ('Suitable (arrangements for) night-watches and sentry-rounds are to be made'). Lawrence 92 entitles C28–29 [*93.5–11*] 'Guard-duties on an *improvised* wall' (my emphasis) and goes on to comment that '[a] hastily built wall would be so low that the safety of the sentries depended on showing no light that might reveal their movements to a sniper'. While this point about the light is valid enough in general terms (see under the next lemma), it seems to me inconceivable that Ph. is still talking about the τρίγωνον τεῖχος of C18 [*92.22–27*] – if that is indeed what Lawrence had in mind – or anything like it.

The first of the pair of nouns here recurs at C30.8–9 [*93.18–19*], C34.2–3 [*95.33–34*], and from the attackers' standpoint at D94.1–2 [*100.35–36*]. Garlan 310 and *passim* translates it 'bivouac', but that – as adopted into English, at any rate – places a purely locative emphasis on a term that needs to describe a military function; likewise 'night-quarters' (Lawrence 93 and *passim*). Compare Aen.Tact. 13.3, where the assembled corps of mercenaries discharge 'their leitourgiai and their ekkoitiai and their other assignments'. Here in Ph., those troops whose sole or primary role is to keep watch do this either in stationary mode as guards (on a waking or sleeping rota, in accordance with the etymology of the word itself) or else as patrollers. Though the noun *ephodeiai* (also attested in Polybius, Polyaenus and Dio) is not repeated, Ph. has already used the cognate verb in A15.6–7 [*80.38–39*] and will do so again here (C28.3–4 [*93.7–8*]).

See further under the next lemma.

C28.2–4 [*93.6–8*] **<ἐν> αἷς χρήσονται ξυλίνοις λαμπτῆρσιν, ἵνα ὑπὸ τοὺς πόδας μόνον φαίνωνται καὶ μὴ καταφανεῖς ποιῶσι τοὺς ἐφοδεύοντας τοῖς ὑπεναντίοις** ('in which (latter the men) will use wooden lanterns, in order that they would reveal only (what is) underfoot and would not make the sentries conspicuous to the enemy'). In broadbrush terms Ph.'s advice for night-watches and sentry-rounds follows the precedent set by Aen.Tact. 22 and 26 respectively (with 24–25 on passwords etc.: see under the next lemma). Precise correspondences between the two sets of recommendations are rather few, but this matter of patrollers and their lanterns is one of them: 'patrols should not carry lanterns except on very dark and stormy nights; failing that, any lantern carried must be covered with something to make it shine only on the ground in front of their feet, not upwards' (Περιοδεύειν δὲ ἄνευ λαμπτῆρος, ἂν μὴ λίαν χειμὼν ᾖ καὶ σκότος· εἰ δὲ μή, οὕτω ὁ λαμπτὴρ φεγγέτω, εἰς ὕψος μὲν μηδὲν (κεκαλύφθω γάρ τινι), ἐπὶ δὲ τὴν γῆν καὶ τὰ πρὸ τῶν ποδῶν μόνον φεγγέτω: Aen.Tact. 26.3). As commentators have noted (Garlan 384 n.28*d*; Bettalli, *Enea* 291), block A col.1 of the Macedonian army regulations from Amphipolis (ISE 114; Hatzopoulos, *L'organisation* 161–164 no.3; translations Burstein no.66, Austin[2] no.90), reckoned to date from between 221 and 179, includes one which flatly forbid patrols to carry lights – a more severe policy than either Aeneas or Ph. deem necessary.

I cannot explain the significance of Ph.'s lanterns being wooden (as opposed to the norm of bronze or iron) in implementing the policy he wants.

C29.1–4 [*93.8–11*] **Τούτοις δὲ καὶ τοῖς ἀμφοδάρχαις συνθήματα καὶ ὑποσυνθήματα παρα τῶν στρατηγῶν δίδοσθαι δεῖ, τὸ μὲν φωνῆεν, τὸ δὲ ἄφωνον** ('To these (sentries) and to the amphodarchs it is necessary that passwords and password-supplements be given from the generals: the one (category) spoken, the other silent'). On the amphoda see already C23 under **τοῖς ἀμφόδοις** and C26 under **Δημοσίᾳ**; their amphodarchs are mentioned here for the first time. So too are the city's commanding generals (*stratêgoi*); see again at C44.6–8 [*94.18–20*] (singular) and C48 [*94.29–31*]. In D96–97 [*103.39–43*] the attackers are advised to bribe them, for a short-cut to victory.

Ph.'s views on passwords (συνθήματα) and password-supplements (ὑποσυνθήματα), expanded in C35–38 [*93.36–52*], invite comparison with Aen.Tact. 24–25. There the latter are called παρασυνθήματα, as is also the case in two other writers who broach the topic: Polybius (9.13.9, 9.17.9) and, more discursively, Onasander (25–26). See generally Y. Garlan, 'ΣΥΝΘΗΜΑΤΑ', *BCH* 100 (1976) 299–302.

Lawrence 93 ('passwords and recognition-signals respectively by word of mouth and in dumb show') also brings out unambiguously what other translations do not quite manage to convey: it is the συνθήματα that involve words, while the ὑποσυνθήματα are silent. The rationale of the latter, with examples, will be given in C36–37 [*93.41–48*].

C30–33 [93.11–32]: intramural security and retaliation

C30.1–2 [*93.11–12*] **Δεῖ δὲ κεκλεῖσθαι τὰς πύλας καθάπερ καὶ τὰς τῆς πόλεως καὶ τὰς τῶν ἀμφόδων** ('It is also necessary that the gates be kept closed, those of the city and those of the amphoda alike'). This is slightly more caution, even, than we see in Aen.Tact. 28.1–2: 'when a city is in a state of terror the following precautions too are needed. Keep all the gates closed, but one open where access to the

town is most difficult and from which anyone approaching is visible over the longest distance, (2) and even here only a wicket (should remain open), so that men have to go out and come in by the wicket gate one at a time' (Προνοεῖσθαι δὲ καὶ τάδε ἐν φόβῳ οὔσης πόλεως. Πύλας τὰς μὲν ἄλλας κεκλεῖσθαι, μίαν δὲ ἀνεῳχθαι ἢ ἂν δυσπροσοδώτατον ᾖ τῆς πόλεως καὶ ἐπὶ πλεῖστον ἀπ᾽ αὐτῶν μέλλωσιν ὁρᾶσθαι οἱ προσιόντες, (2) καὶ ἐν ταύτῃ ἐκτομάδα, ἵνα σώματα μὲν ἀνθρώπων κατὰ τὴν ἐκτομάδα πυλίδα ἐξίῃ καὶ εἰσίῃ καθ᾽ ἕνα). Lawrence 248 understands κεκλεῖσθαι there to mean actually blocked up, as in the unidentifiable anecdote Aeneas has already given (23.4, with ἀπεδείμαν), but in my view both Aeneas and Ph. are talking about simple, routine closure. See also Aen.Tact. 18.16, and cf. e.g. Xen. *Hell.* 5.4.7 (of a door).

The gates of the amphoda are mentioned again at C30.12–13 [*93.22–23*], as providing security for the defenders if they try to mount a counter-attack but are forced to retreat.

C30.5–7 [*93.15–17*] **πρῶτον μὲν τοῖς καταπάλταις καὶ τοῖς λιθοβόλοις, ἔτι δὲ <τοῖς> τοξεύμασι καὶ τοῖς λίθοις πάντοθεν τυπτόμενοι κακὰ πάθωσιν** ('they would first suffer badly when struck by the catapults and stone-projectors, as well as by arrows and by stones from all directions'). These are the weapons, in "civilian" hands, that have been mentioned in C25–26 [*92.49–93.3*]: the (light) artillery assigned and located at amphodon level, the arrows and stones in individual houses.

C30.7–11 [*93.17–21*] **μετὰ δὲ ταῦτα ἐκφοιτῶσι καὶ βοηθῶσιν οἱ πολῖται καὶ στρατιῶται ἐκ τῶν ἐκκοιτιῶν καὶ τῶν ἀμφόδων συντεταγμένοι καὶ ἡγεμόνας ἔχοντες ἐπιτιθῶνταί <τε> τοῖς πολεμίοις ὅταν ὑπολαμβάνωσι καιρὸν εἶναι κτλ.** ('after that the citizens and troops would issue forth from the night-watches and the amphoda and bring help; in formation and under command they would fall upon the enemy when they saw an opportunity etc.'). This is all rather vague, and how much precision underlies it is hard to tell. Garlan 384 n.30*a* comments that '[l]es mercenaires paraissent avoir été logé, non dans des campements isolés, mais dans les ἄμφοδα, sans doute chez les particuliers' (for such a dispersed system cf. Aen.Tact. 12.1 and 13.3), though his later comment on C45.3–5 [*94.22–24*] appears to contradict this; see the Comm. there. Be that point as it may, two matters of significance are left unclear: the criteria by which the 'citizens' who act here as front-line soldiers are differentiated from those whose role is in civil defence, and how the command-structure alluded to here (συντεταγμένοι καὶ ἡγεμόνας ἔχοντες) relates to the one already implied by the mention of amphodarchs (C29.1–2 [*93.8–9*]).

C30.12–13 [*93.22–23*] **ἐχόντων τῶν ἀμφόδων πύλας** ('because the amphoda have gates'). My understanding of this phrase is in line with that of Diels-Schramm 58 ('vorausgesetzt nämlich, dass die Strassen Tore haben'). Lawrence 95 sees a personal and implicit subject for ἐχόντων ('they can retire to safety owing to their holding the gates of parallel streets'), which is harder to extract from the Greek as transmitted. (Garlan 311 sidesteps the issue with his 'grâce aux portes des avenues'.)

C31.1–3 [*93.23–25*] **οἵ τε παῖδες καὶ αἱ δοῦλαι καὶ αἱ γυναῖκες καὶ αἱ παρθένοι τύπτωσιν ἀπὸ τῶν στεγῶν καὶ πάντες ὅσοι κατὰ τὴν πόλιν ἐνεργοί** ('and the children and the slave-women and the (free) women and the girls would strike (them) from the rooftops, and everyone throughout the city would be in action'). The first category in this list, it is universally agreed, is παῖδες *qua* young children (boys and girls alike), not *qua* (male) slaves. Consequently, male slaves – δοῦλοι as opposed to these δοῦλαι (Lawrence 95 has '(sc. male) slaves', misleadingly or in error) – are not included. That Ph.'s city does contain male slaves could of course have been safely presupposed even if D13.1–2 [*97.41–42*] had not mentioned them in the attackers' initial propaganda announcements: individual *douloi* will win their freedom if they do something to deserve it. Garlan 384 n.31*a* must therefore be right to explain that the reason why *douloi* do not feature in the present passage as non-combatants is because Ph. assumes that they would be, on the contrary, combatants. Compare generally e.g. Diod.Sic. 18.51.3 (Kyzikos vs. Arrhidaeus), 18.70.1 (Megalopolis vs. Polyperchon), 20.84.3 and 20.100.1 (Rhodes vs. Demetrius Poliorcetes); Plb. 16.31.1–2 (Abydos vs. Philip V).

In an attempt to be more precise, Garlan, *Slavery* 163–176, at 172, writes that '[a]t the start of the siege operations of which the author writes, slaves were not included in the fighting forces. Indeed it was in order to dissuade the citizens from arming their servants that Philo advised the assailants to promise liberty to those who would work actively for the town's downfall. But the fact that, when the enemy breached the walls, the male slaves were not present to protect the children, female servants, women, and young girls by striking at the enemy from the rooftops certainly shows that, when the crisis came, they were fighting alongside the free men (whether or not they had been formally enrolled in the army)'. Though most of this is sound, I find its opening inference fallacious. A besieged city would, very often, arm its slaves (and/or metics) when facing a military crisis, and steps by the attackers to thwart this, if taken, did not always and necessarily have the desired effect.

At any rate, Ph.'s rooftop scenario as a whole – still in Veget. 4.25 (*de fenestris ac tectis omnis aetas ac sexus inrumpentes obruit saxis aliisque generibus telorum*) – is a *topos* in the historiographical record; cf. Bettalli, *Enea* 219. A classic instance is Plataiai in 431 (Thuc. 2.4.2, Aen.Tact. 2.6), but see also e.g. Thuc. 3.74.1 (Corcyra, 427); Diod.Sic. 13.56.7–8 (Selinous, 409); Paus. 1.13.8 (death of Pyrrhus of Epirus at Argos, 272; cf. Plut. *Pyrrh.* 34.2 and Polyaen. 8.68), 4.21.6, 4.29.5; Polyaen. 8.69; Liv. 5.21.10. For these and other instances, with general discussion, see (e.g.): D. Schaps, 'The women of Greece in wartime', *CPh* 77 (1982) 193–213, at 195–196; F.D. Harvey, 'Women in Thucydides', *Arethusa* 18 (1985) 67–90, at 73–74; W.D. Barry, 'Roof tiles and urban violence in the ancient world', *GRBS* 37 (1996) 55–74; P. Loman, 'No woman, no war: women's participation in ancient Greek warfare', *G&R* 51 (2004) 34–54, at 42; Chaniotis, *War* 106–111.

For *energos* applied to a militarily active person (as opposed to something impersonal like an attack) cf. e.g. Plb. 3.17.4 on Hannibal at Saguntum: ἐνεργὸς ἐγίνετο περὶ τὴν πολιορκίαν. (Note also Xenophon's view, in *Hipp.* 9.7, that a body of troops will be ἐνεργότατον if its members are those with the greatest hostility to the enemy.)

C32.1–3 [*93.25–27*] **Ὀρθῶς δ᾽ ἔχει καὶ κατά τινας τόπους ἔνδοθεν ἀντιταφρεύειν καὶ κρύπτειν τὰς τάφρους** ('It is also good practice to employ counter-trenching at certain places inside and to conceal the trenches'). At A10.4 [*80.19*] one of the purposes of the sixty-cubit (or larger) gap between the perimeter wall and the closest houses is to create room for 'ample trenching inside, if any is needed' (ταφρείαν ἔνδοθεν ἱκανήν, ἐάν τι δέῃ); and the present passage appears to take that up.

Though Ph's verb ἀντιταφρεύειν is his own (and a *hapax legomenon*), in broad terms the advice here is in the tradition of Aen.Tact. 39.1–2: 'dig a trench in the gateway and for some distance inside it, leaving room to pass on both sides, and then send out men to skirmish with the enemy and induce some of them to join the rush back into town. (2) Your own people, as they flee into the city, must of course run in along the two side-passageways which have been left; but any of the enemy who run in with them will not have been forewarned about the trench, especially if it has been concealed, and will probably fall into it and be killed inside the city' (Ἐν ταῖς πύλαις καὶ εἰς τὸ ἔσω μᾶλλον μέρος ὀρύξαντα τάφρον ἔνθεν καὶ ἔνθεν πάροδον λιπόντα, ἔπειτα ἐπεξελθόντας τινὰς ἀκροβολίζεσθαι καὶ προσάγειν τῶν πολεμίων ὥστε συνεισδραμεῖν εἰς τὴν πόλιν. (2) Τοὺς μὲν οὖν ἐκ τῆς πόλεως καταφεύγοντας εἰς τὴν πόλιν χρὴ ἔνθεν καὶ ἔνθεν παρὰ τὰς λελειμμένας παρόδους εἰστρέχειν· τοὺς δὲ τῶν πολεμίων συνεισστρέχοντας εἰκός ἐστι, μὴ προειδότας τὴν τάφρον, ἅμα τε καὶ κεκρυμμένης οὔσης, εἰσπίπτειν καὶ φθείρεσθαι ἔσω τῆς πόλεως).

C32.4–5 [*93.28–29*] **πολλοὶ δι᾽ ἄγνοιαν αὐτῶν φθείρωνται** ('many would perish through ignorance of the(se trenches)'). Ph. reflects here the language of war-narratives. Compare e.g. πλείους δὲ ὑπὸ τῶν ἰδίων ὡς ὑπὸ πολεμίων δι᾽ ἄγνοιαν ἀπώλοντο (Diod. Sic. 11.10.2 on Thermopylae, 480; cf. generally 20.42.2 on Ophellas's army in Libya, 308: πολλοὶ διὰ τὴν ἄγνοιαν ἐπιβαίνοντες δήγμασι θανατηφόροις περιέπιπτον); and πολλοὶ δὲ τῶν Χαλκιδέων δι᾽ ἄγνοιαν ἀπόλλυνται (Aen.Tact. 4.3 on Chalkis in an episode of uncertain date but perhaps 357: see Whitehead, *Aineias* 105–106; Bettalli, *Enea* 221–222).

C33.1–4 [*93.29–32*] **Δεῖ δὲ καὶ τὴν ταχίστην καθ᾽ ὃ ἂν πέσῃ τὸ τεῖχος χάρακα θεμένους καὶ φορμοὺς γῆς ἐμπλήσαντας προτείχισμα κατασκευάσαι** ('It is also necessary, wherever the wall might fall, immediately to put in place a palisade and to provide an outwork by filling baskets of earth'). The phrase καθ᾽ ὃ ἂν πέσῃ τὸ τεῖχος has been differently understood by, on the one hand, Diels-Schramm 59 ('wo die Mauer gefallen ist') and Lawrence 95 ('at any place where the Wall has fallen') and, on the other, Garlan 311 ('là où on s'attend à une brêche dans la muraille') and B. Campbell, *Military Writers* 161 ('where it is expected that a breach may be made in the wall'). The syntax, aorist subjunctive with ἄν, justifies the latter.

On palisades see A37 under **Αἱ δὲ χαρακώσεις**; on baskets, B51 under **φορμούς**. To designate the structure which these baskets of earth will create Ph. uses the same noun, *proteichisma*, that he has hitherto been applying (and will continue, elsewhere, to apply) to outworks proper, i.e. outside the walls: see A32 under **κάτωθεν**. In the present passage, by contrast, what is envisaged is an intramural 'retirade': so Garlan 385 n.33*a*, with 243 (and 380 n.18*a* on other vocabulary, in other writers, for this and similar things).

C34–38 [93.32–52]: more on passwords; password-supplements

C34.1–4 [*93.32–35*] **Καὶ οἷς ἂν ἀπιστῇς τῶν στρατιωτων ἢ τῶν πολιτῶν, ὀρθῶς ἔχει μεταλλάσσειν αὐτῶν τὰς ἐκκοιτίας καὶ τὰς φυλακὰς καὶ μὴ εἰδέναι αὐτούς, καθ᾽ ὃν τόπον φυλάξουσι τὸ τεῖχος** ('Also, as regards those of the troops or the citizens whom you might distrust, it is good practice to change their night-watches and their guard-duties and not to (let them) know which place on the wall they will be guarding'). On *ekkoitiai* see C28 under **Ἐκκοιτίας**. The distinction between them and *ephodeiai* is unproblematic on the basis that the latter entail movement. Differentiating between *ekkoitiai* and *phulakai* (as the present phrase seems to require; by a slip Arnim, *Index* 87 mis-classifies φυλακάς here as the accusative plural of φύλαξ) is perhaps a matter of nocturnal vs. diurnal watches, or else more specific assignments for the 'guards'.

Again, Ph.'s concerns here are ones already expressed in similar terms (and met with comparable policies) by Aeneas (22.7–8, in this instance, with Whitehead, *Aineias* 155 on the reversal of the last two clauses as transmitted): 'here are more matters which demand consideration in times of danger. None of the sentries should know in advance either when or where he will be on guard in the city; nor should the same officers always be in command of the same men; instead, where guarding the citizens is concerned, change everything as frequently as possible, because that is the way to minimize the opportunities for a traitor to betray anything to those outside or to receive anything from the enemy; (8) they would not know in advance where on the wall and in whose company they were scheduled to spend the night, but would be unaware of what was to come; for it is not desirable that every men should know beforehand what his duties will be. And those who have stood guard during the day should not go on guard at night' (Ἔτι δὲ χρὴ ἐν τοῖς κινδύνοις τάδε προνοεῖν. Τῶν φυλάκων μηδένα προγιγνώσκειν μήτε ὁπόστην μήτε ὅπου φυλάξει τῆς πόλεως· μηδὲ τῶν αὐτῶν ἀεὶ τοὺς αὐτοὺς ἡγεῖσθαι, ἀλλ᾽ ὡς πυκνότατα πάντα μεθιστάναι τὰ περὶ τὴν πολιτοφυλακίαν· οὕτω γὰρ ἂν ἥκιστά τις δύναιτο τοῖς ἔξω προδιδοὺς δηλοῦν τι ἢ προσδέξασθαι παρὰ τῶν πολεμίων, (8) μὴ προειδότες ὅπου τοῦ τείχους τὴν νύκτα ἔσονται μηδὲ μεθ᾽ ὧν, ἀλλ᾽ ἀγνοοῦντες τὸ μέλλον· οὐ γὰρ ἐπιτήδειον προειδέναι ἃ μέλλει ἕκαστος πράσσειν. Καὶ τοὺς ἡμέρας φυλάξαντας μὴ φυλάσσειν νυκτός). Aeneas's μεθιστάναι there becomes, here in Ph., μεταλλάσσειν (repeated at C35.1–2 [*93.36–37*] – see the next lemma; and cf. γενομένης τῆς μεταλλαγῆς at C35.5–6 [*93.40–41*]).

C35.1–5 [*93.36–40*] **Μεταλλακτέον δέ ποτ᾽ ἐστὶ καὶ τὰ συνθήματα, ἵνα ἐὰν τῶν ἔνδοθεν τις κακουργῶν τὸ σύνθημα δῷ τοῖς πολεμίους ἢ αὐτοὶ <ἑαυτοὺς> νυκτὸς ὑποτάξαντες τῷ τείχει λάβωσιν, ἀχρεῖον αὐτοῖς ᾖ** ('And the passwords are to be altered occasionally, too, in order that if someone on the inside, acting wickedly, were to give the password to the enemy – or if they themselves seized it by posting <themselves> below the wall at night – it would be useless to them'). In the phrase τῶν ἔνδοθέν τις κακουργῶν the final word could be either the genitive plural of the noun κακουργός or the present participle of the verb κακουργεῖν. Lawrence 95 ('one of the evil-doers within') opts for the former. I have preferred the majority view (Diels-Schramm 59, 'hochverräterisch'; Garlan 311, 'par malveillance'; Arnim, *Index* 40).

Ph.'s worries about internal treachery continue here from C34 [*93.32–36*]. His point here about the desirability of occasional changes to the passwords – not anticipated, this time, by anything in Aeneas – comes (somewhat illogically) before he has said anything substantive about the choice of passwords *per se*; for that, see C38 [*93.48–52*].

C36.1–4 [*93.41–44*] **Τὰ <δ'> ὑποσυνθήματα ἄφωνα δίδοται πρὸς τούτῳ <ἵνα> κἂν ἀκούσωσιν οἱ πολέμιοι τὸ σύνθημα, καταφανεῖς γίνωνται οἱ λάθρα ἐπὶ τὸ τεῖχος ἀναβάντες** ('Silent password-supplements are given as well, <in order that> even if the enemy were to hear the password, those who have climbed up on the wall would become conspicuous'). Ph.'s view that password-supplements are/should be silent takes up C29.3–4 [*93.10–11*] (see the Comm. thereto). What is now added is the rationale of this.

It is not a position taken by (or inherited from) Aeneas, whose discussion allows for both aural and visual supplements (Aen.Tact. 25): 'some also use password-supplements, both to prevent panics and to make identifying friends easier. (2) The password-supplements should be as distinctive as possible and as difficult as possible for the enemy to latch onto. Suitable password-supplements might be the following. On dark nights the man demanding the password could add some other vocal sound or, preferably, make a noise; and in giving it, the man challenged would add some other pre-arranged sound or noise. In good light the challenger might take off his cap or, if he has it in his hand, put it on, (3) or pull it down over his forehead and push it up again, (4) or dig his spear into the ground as he approaches, or take it in his left hand, or hold it aloft in his hand, or raise it; and the man responding would not only give the password but in doing so perform one of these pre-arranged actions' (Ἔνιοι δὲ παρασυνθήμασι χρῶνται τῶν τε πανείων ἕνεκεν καὶ πρὸς τὸ γνωρίζειν μᾶλλον τοὺς φίλους. (2) Εἶναι δὲ καὶ παρασυνθήματα ὡς ἰδιαίτατα καὶ δυσγνωστότατα τοῖς πολεμίοις. Εἴη δ' ἂν τὰ παρασυνθήματα τοιάδε. Ἐν μὲν ταῖς σκοτειναῖς νυξὶν τό τε σύνθημα ἐρωτᾶν καὶ φωνεῖν τι, μᾶλλον <δὲ> καὶ ψόφον ἐμφανίσαι, τὸν δὲ ἐρωτώμενον τό τε σύνθημα ἀποκρίνεσθαι καὶ ἄλλο τι προσυγκείμενον φωνῆσαι ἢ ψόφον ἐμφανίσαι· ἐν δὲ τοῖς φαεινοῖς χρόνοις τὸν μὲν ἐρωτῶντα τὸ σύνθημα τὸν πῖλον ἀφελέσθαι ἢ ἐν τῇ χειρὶ ἔχοντα ἐπιθέσθαι, (3) ἔστιν δὲ καὶ ἐπαγαγέσθαι τὸν πῖλον ἐπὶ τὸ πρόσωπον καὶ ἀπαγαγέσθαι ἀπὸ τοῦ προσώπου, (4) ἔτι δὲ καὶ τὸ δόρυ καταπῆξαι προσιόντα ἢ εἰς τὴν ἀριστερὰν παραλαβεῖν, ἢ ἔχειν ἐν τῇ χειρὶ ἄραντα ἢ ἀνελέσθαι, τὸν δὲ ἐρωτώμενον τό τε σύνθημα ἀποκρίνασθαι καὶ τούτων τι προσυγκείμενον ποιῆσαι). For his part, Onasander – see already C29 under **Τούτοις** – begins his shorter discussion of the topic (26.1–2) by advising that the supplement be expressed 'not via the voice but via the body' (μὴ διὰ φωνῆς … ἀλλὰ διὰ σώματος), and underlines his preference for physical gestures by pointing out their particular utility in a polyglot body of troops. (Contrary to the suggestion in Whitehead, *Aineias* 171, Onasander's phrase μὴ διὰ φωνῆς is unlikely to be stating, also, a secondary preference for non-human sounds – Aeneas's *psophoi* – over human.)

See further under the next lemma.

C37.1–5 [*93.44–48*] **Ἔστι δὲ τὰ ὑποσυνθήματα τοιαῦτα· ἀπαιτήσαντος δεῖ τὸ σύνθημα ἀφελέσθαι τὴν καυσίαν ἢ τὸν πῖλον ἢ τὴν περικεφαλαίαν ἐὰν ἔχῃ ἢ πρόκωπον τὸ ἐγχειρίδιον ποιῆσαι ἢ τὴν δεξίαν ἐμβαλεῖν ἢ τῆς χλαμύδος ἐπιλαβέσθαι** ('Examples of password-supplements are: when (someone) has asked for the password, (the addressee) must take off his hat or cap or helmet if he has one, or grip his sword by the hilt, or put in his right hand (to the other man's), or grasp the (other's) cloak'). These four examples very broadly correspond with the ones in Aeneas's list, quoted under the preceding lemma – and see also Onas. 26.1 ('whether a "nod" of the hand or a clash of arms or dipping a spear or waving a sword to the side': ἢ νεύματι χειρὸς ἢ ὅπλων συγκρούσει ἢ ἐγκλίσει δορατίου ἢ παραφορᾷ ξίφους).

(i) A gesture involving headgear, as we see, comes directly from Aeneas, the only difference here being that more than one kind is mentioned: *kausia*, *pilos*, *perikephalaia*. (I am inclined to think that Ph.'s addendum 'if he has one' refers only to the helmet, rather than allowing for the possibility of the man being bareheaded.) The *kausia* – glossed by Pollux 10.162 (with reference to its appearance in Menander) as a Macedonian *pilos* – has provoked vigorous controversy in recent times, particularly between E.A. Fredericksmeyer and B.M. Kingsley, by virtue of its role in Hellenistic Macedonian royal dress; however, as that has no bearing on an instance like the present passage, I confine myself to citing Polyaen. 5.44.5 (when Memnon of Rhodes was attacking Kyzikos in 334 [cf. Diod.Sic. 17.7.8] he and his officers wore 'the Macedonian *kausia*', in an (unsuccessful) attempt to dupe the defenders into mistaking them for an army led by their Macedonian ally Calas).

(ii) The noun ἐγχειρίδιον ostensibly occurs again, in the plural, at D41.3–4 [*99.50–51*], but in a phrase conventionally deleted (after Schoene) as an intrusive gloss there. Be that as it may, in the present passage I am content to follow my predecessors in translating it as 'sword' (even though LSJ s.v. II.1 registers only '*hand-knife, dagger*'); on this matter, note that the list of synonym-pairs (to be avoided when giving out passwords) in Aen.Tact. 24.2 includes ξίφος/ἐγχειρίδιον. (Ph. never uses the term ξίφος, but does use a much rarer one, ξιφοδρέπανα, at D41.4 [*99.51*], which apparently generated the glossing phrase ἀντὶ τῶν ἐγχειριδίων noted above.) Sword vocabulary apart, Ph.'s adjective here, πρόκωπος, is first attested in this kind of phrase in Attic tragedy (Aesch. *Ag.* 1651, ξίφος προκώπον πᾶς τις εὐτρεπιζέτω; Eur. *Or.* 1477, ξίφος πρόκωπον ἐν χεροῖν ἔχων), and the idiom also occurs in Lucian (*de domo* 30) and Aelian (fr.70 Hercher). LSJ s.v. gives two translations, '*grasped by the hilt, drawn*', but they do not mean the same thing. The problem can resolved by jettisoning the 'drawn' option, which lacks etymological justification; and in the present context a gesture of 'making the sword handle-forward' (as Ph.'s phrase literally means) would be an appropriate one for us to visualize. (Onasander's examples, above, do include a *paraphora* of a sword which is already drawn, or so one would assume; as a group, though, they seem more histrionic than either Aeneas's or Ph.'s.)

(iii) Ph.'s phrase τὴν δεξίαν ἐμβαλεῖν is translated 'tendre en avant sa main droite' by Garlan 311 and 'stretch out your right hand' by Lawrence 95; however, ἐμβαλεῖν describes actual contact – a clasp of hands – rather than the mere offer of contact (which would have been expressed by ἐκτείνειν or the like). Thus, rather,

'die rechte Hand darauflegen' (Diels-Schramm 59). For the idiom, LSJ s. v. ἐμβάλλω I.2 cites Attic tragedy (Soph. *Trach.* 1181, ἔμβαλλε χεῖρα δεξίαν πρώτιστά μοι) and comedy (Aristoph. *Vesp.* 554, ἐμβάλλει μοι τὴν χεῖρ'; *Ran.* 754, ἔμβαλέ μοι τὴν δεξίαν – and add 789, κάνέβαλε τὴν δεξίαν); one could also invoke oratory (Aeschin. 3.224, Demosth. 21.119), and numerous instances in Plutarch and later writers.

(iv) For the idiom τῆς χλαμύδος ἐπιλάβεσθαι cf. Plb. 18.53.10: ὁ Πτολεμαῖος θρασέως ἐπελάβετο τῆς χλαμύδος αὐτοῦ (in 196 young Ptolemy, about to become Ptolemy V Epiphanes, accosts the renegade general Scopas). With that parallel in mind, I do believe that the gesture Ph. lists here is that of touching the other man's chlamys, not one's own. (The opposite view is taken by Garlan 311 and Lawrence 95; 'den Mantel anfassen' in Diels-Schramm 59 is ambiguous.)

C38.1–2 [*93.48–49*] **Ξένα δὲ καὶ διπλᾶ δοτέον ἐστὶ τὰ συνθήματα** ('The passwords given should be strange and double'). After dealing with the mute accompanying supplements to passwords, Ph. now remembers to say more about the passwords themselves.

The historical record is replete with episodes where, under combat conditions of various kinds, passwords contributed to overall success or else, for whatever reason(s), to confusion and failure. Aen.Tact. 24 (partially summarized below) incorporates some from each category, and for the latter see also e. g. Thuc. 7.44 (the Athenians et al. on the Epipolai heights above Syracuse in 413) and Plb. 9.17.9 (again below). Aeneas – a military man as well as a theoretician – declares in 21.2 that 'the proper procedure for posting sentries and patrols, dealing with panics, and devising passwords and password-supplements' were subjects scheduled for full coverage in his *Stratopedeutikê biblos* (*Encampment*), but since that manual is either lost or was never written it is fortunate that ch.24 of the work that does exist provides a summary. Setting aside the anecdotal material, his advice is as follows: avoid the ambiguity that can arise from synonyms etc. (24.1); issue passwords that are easy to remember and, if possible, are related to the business in hand (24.14–15); consider emulating the Athenian general Iphicrates, who gave separate passwords to patrols and to sentries (24.16); have a prearranged whistle-signal for guards who may lose touch with each other (24.17–18); and insist that patrols and sentries ask *each other* for their passwords (24.19).

Very little of this has come through into Ph., as transmitted. Instead, we simply have the phrase lemmatized above, and the accompanying explanation that the purpose of making the passwords 'strange and double' is to minimize the risk from enemy eavesdropping (ἵν' ἐργωδῶς οἱ πολέμιοι καταμανθάνωσιν αὐτά, ἐὰν [δὲ] ἐξάκουστον ἀπὸ τοῦ τείχους τι γένηται). In wanting passwords to be ξένα, Ph. seems flatly to contradicts Aeneas's opinion on the matter. The concept of 'double' passwords finds an echo in a phrase used by Polybius (9.17.9) when criticizing Aratus at Kynaitha in c.241 for 'creating a single password, being young and inexperienced in the accuracy of double passwords and password-supplements' (τὸ ποιήσασθαι τὸν στρατηγὸν ἁπλοῦν τὸ σύνθημα, νέον ἀκμὴν ὄντα καὶ τῆς τῶν διπλῶν συνθημάτων καὶ παρασυνθημάτων ἀκριβείας ἄπειρον). Walbank interprets διπλᾶ there as referring to password-plus-supplement combinations (HCP 2.144); however, while that might be true there, here in Ph. the doubling, as Garlan 385 n.38*b* comments, is less likely to mean password-plus-supplement combinations (supplements having been dealt with in the preceding two chapters) than something relating purely to the passwords themselves. Garlan envisages 'la necessité de ne pas fixer le même signe de reconnaissance pour la demande et pour la réponse', and cites Aeneas on Iphicrates; alternatively, what Ph. has in mind is the sort of *reciprocal* system advocated at the end of Aeneas's exposition. (For both, see above.)

C38.4–5 [*93.51–52*] **ἐὰν [δὲ] ἐξάκουστον ἀπὸ τοῦ τείχους τι γένηται** ('if anything becomes audible (away) from the wall'). For 'audible' sounds, as opposed to people, cf. e. g. Diod.Sic. 20.67.2 (τῆς τῶν Καρχηδονίων κραυγῆς ἐξακούστου γινομένης); Plut. *Num.* 10.6, *Phoc.* 19.3, *Pomp.* 80.1, *Mor.* 171D; Athen. *Deipn.* 8.361E.

C39–44 [94.1–20]: destruction of enemy equipment

C39.1–4 [*94.1–4*] **<...> καὶ αὐτῶν τὰς δοκίδας καὶ τὰς προστιθεμένας κλίμακας ἐκ τοῦ πλαγίου τύπτοντας τοῖς λιθοβόλοις ῥᾴδιόν ἐστι συντρίβειν καὶ ἀπορρίπτειν ἀπὸ τοῦ τείχους** ('<...> and their screens and the ladders being deployed, when (you) strike them from the flank with stone-projectors, are easy to crush and to thrust away from the wall'). All editors accept Haase's lacuna at the beginning of this chapter. The subject has switched abruptly since C34–38 [*93.32–52*], and how much material is missing is impossible to estimate.

For such 'screens' see A22 under **καταγνύωσι**; for scaling-ladders, A12 under **ἵνα**. The notions, here, of striking from the flank with lithoboloi (so as to crush) and thrusting away from the wall might apply separately to the screens and to the ladders, in which case it might be that the missing material included something like what we see in Aen.Tact. 36 (on preventing the placing of ladders: see already A79 under **οἱ τρίβολοι** and especially **αἱ ἀγκυρωτοί**). Compare in any event the misplaced A79–80 [*85.35–41*].

C39.4–6 [*94.4–6*] **ἢ τῇ νάφθᾳ, ἐὰν ἔχῃς, ῥάναντα καὶ λαμπάδας ἄνωθεν ἐμβαλόντα κατακαῦσαι** ('alternatively sprinkle them with naphtha, if you have it, and hurl torches on and burn them up'). Schoene retains the paradosis here, τὴν ἄφθαν (and LSJ s. v. registers ἄφθα (B) as a variant of νάφθα); otherwise it is orthodox to accept the emendation of Brinkmann ap. Schoene to the text given here. (The associated change from accusative to dative could be argued either way: see generally LSJ s. v. ῥαίνω.) In any event Ph. seems to be using here a more common word for what he has previously called *naptalion*; see B53 under **ναπτάλιον**.

Ph.'s advice here is in the tradition of Aen.Tact. 33.1: 'when tortoises have been brought forward you must pour pitch and throw oakum and sulphur over them, and then drop onto them a burning bundle of sticks tied to a rush rope. Materials of this kind, suspended outwards from the wall, can also be thrown onto machines as they are being brought forward' (Χρὴ δὲ ταῖς προσενεχθείσαις χελώναις ἐπιχεῖν πίσσαν καὶ στυππεῖον καὶ θεῖον ἐπιβάλλειν, ἔπειτα φλογωθέντα φάκελλον καὶ ἐξάψαντα ἐπαφιέναι σχοίνῳ ἐπὶ τὴν χελώνην. Τὰ δὲ τοιαῦτα προτεινόμενα ἀπὸ τοῦ τείχους ἐπιβάλλεται τοῖς προσαγομένοις μηχανήμασι). Within Ph. himself, C39–41 [*94.1–*

10] as a whole connect with the sections which describe the use of fire in a naval context: C55–58 [*95.5–20*] and, from the attackers' standpoint, D104 [*104.19–21*].

On Schoene's view that C44 [*94.13–20*] should be transposed to follow C39 [*94.1–6*] see the Comm. thereto, below.

C40.1–3 [*94.6–8*] **ὡσαύτως δὲ καὶ τὰς χελώνας καὶ τὰ μηχανήματα ὅταν ἐγγὺς γένηται τοῦ τειχίσματος ἐμπιπράναι** ('in the same way (it is easy) to set alight tortoises and machines when they come near the rampart'). Cf. Aen.Tact. 33.1, quoted under the preceding lemma.

Schoene tentatively suggested τοῦ <προ>τειχίσματος, but nobody has followed him; Ph. does use τείχισμα once elsewhere (A37.2 [*82.33*]).

C41.1–3 [*94.8–10*] **Ἀφετέον δέ ἐστιν ὡς αὐτὰ καὶ πυροφόρους ὡς πλείστους καὶ τριβόλους καιομένους στιππύῳ περιειλι<γμένους** ('Also to be discharged on them are incendiaries in the greatest possible numbers and burning *triboloi* wrapped in oakum < …'). The transmitted περιειλιστέον at the end of this clause (and chapter) becomes περιειλι<γμένους. (42) …Χρη>στέον in the standard emendation of Brinkmann ap. Schoene; the phrase thus produced, τριβόλους … στιππύῳ περιειλιγμένους, anticipates the (otherwise unique) one in C55.4 [*95.8*].

For incendiaries see C12 under **Ἐὰν δὲ ὦσιν**. On the *triboloi* of various kinds in Ph., including these fiery ones, see A79 under **οἱ τρίβολοι**, and cf. Aen.Tact. 33.2: 'prepare timbers (shaped) like pestles but much bigger, and hammer into the ends of each timber sharp iron spikes, <smaller> and larger, and around the other parts of the timber, separately, top and bottom, (place) highly combustible materials – so as to look like an artist's impression of a thunderbolt; you should drop this onto the oncoming machine, and its design will ensure its sticking into the machine and, once stuck, keeping the fire going' (Παρεσκευάσθω ξύλα οἷον ὕπερα, μέγεθει δὲ πολλῷ μείζω· καὶ εἰς μὲν τὰ ἄκρα τοῦ ξύλου κροῦσαι σιδήρια ὀξέα <μικρότερα> καὶ μείζω, περὶ δὲ τὰ ἄλλα μέρη τοῦ ξύλου καὶ ἄνω καὶ κάτω χωρὶς πυρὸς σκευασίας ἰσχυρᾶς· τὸ δὲ εἶδος γενέσθω οἷον κεραυνὸς τὸ γραφόμενον· τοῦτο δὲ ἀφίεσθαι χρὴ ἐς τὸ προσαγόμενον μηχάνημα ἐσκευασμένον οὕτως ὥστε ἐμπήγνυσθαι εἰς τὸ μηχάνημα καὶ ἐπιμένειν τὸ πῦρ ἐμπαγέντος αὐτοῦ). (For thunderbolts on coins, pottery, and even the cheek-piece of a helmet see the references at Whitehead, *Aineias* 197.) In *Par.Pol.* 246.14–248.3 (39.7–36 Sullivan) advice on the construction of an Apollodoran assault-tower includes protecting it against fire-bearing *triboloi*.

C42.1–3 [*94.10–12*] **… Χρη>στέον δέ ἐστι καὶ ταῖς πάλιν προδοσίαις καὶ ταῖς γινομέναις νυκτὸς καὶ ἡμέρας ἐπιθέσεσιν ὅταν λάβῃς καιρόν** ('…> to be used also are counter-treacheries and attacks occurring at night and by day, whenever you can seize an opportunity'). On the textual link with C41, see under the preceding lemma. As with the beginning of C39 (q. v. above), there is no way of knowing how much material has been lost.

The general concept of treachery (*prodosia*) will feature in D72 [*102.9–12*] and D76–83 [*102.27–103.3*] as one of the three prime attacking strategies which can obviate the need for military force. Here first, plural and concrete, are comparably clandestine means for the defending side to thwart their opponents' efforts. Editors retain the transmitted phrase ταῖς πάλιν προδοσίαις, while noting Hermann Schoene's suggestion ταῖς παλιμπροδοσίαις (endorsed by Arnim, *Index* 59); this has parallels in Plb. 5.96.4 and elsewhere.

The 'attacks', *epitheseis*, of the besieged are mentioned again in C44.2–3 [*94.14–15*]; at D2.4 [*96.31*] the attackers launch one.

C43.1–2 [*94.12–13*] **οὕτως γὰρ ἂν τάχιστα κατατυχὼν λύσαις πολιορκίαν** ('for by doing so successfully you might raise a siege most quickly'). For κατατυγχάνειν used absolutely, of success, cf. e. g. Demosth. 18.178.

The idiom of 'raising' a siege is not otherwise used by Ph. himself, but (whether or not produced by the efforts of the besieged, as here) is a cliché of Hellenistic historiography; counting λύειν alone, i. e. without reference to compounds such as *dia-* and *kata-*, Polybius has more than 20 instances, and Diodorus almost 40.

C44.1–3 [*94.13–15*] **Ἐν δὲ ταῖς ἐμπρήσεσι τῶν μηχανημάτων καὶ τῶν χελωνῶν <καὶ> ταῖς συμβαινούσαις ἐπιθέσεσι κτλ** ('In setting fire to machines and to tortoises and in the attacks that take place etc.'). Schoene deleted the words ταῖς ἐμπρήσεσι τῶν μηχανημάτων καὶ τῶν χελωνῶν as an intrusive marginal gloss from the beginning of C40 [*94.6–8*]; and C44 [*94.13–20*] itself, he believed, had been displaced from that same position. His successors retain the paradosis, adding only a <καί> (Diels); and if one does so, the case for transposition loses most of its force.

C44.3–6 [*94.15–18*] **δεῖ τοὺς ὁπλίτας καὶ τοὺς ψιλούς, ὅσοι ἂν μὴ ἐπὶ τῶν τειχῶν ὦσι χρήσιμοι, πάντας διεσκευασμένους ἐν τῷ προτειχίσματι ἑτοίμους εἶναι** ('it is necessary that the hoplites and the light-armed, except those performing useful functions on the walls, should all be prepared (and) ready on the outwork'). The transmitted perfect participle is 'scattered', διεσκεδασμένους (P; διασκεδασμένους V), but emendation to διεσκευασμένους, by Buecheler ap. Schoene, is standard. His comparandum, according to Schoene, was Xen. *Hell.* 4.2.19 (ἀντιπαρήγγειλαν ἅπαντας διασκευάζεσθαι ὡς εἰς μάχην); one could cite, though, closer ones in e. g. Plb. 4.18.3 (οἱ μὲν οὖν Αἰτωλοὶ διεσκευασμένοι καὶ τὰς κλίμακας ἑτοίμας ἔχοντες ἐπετήρουν τὸν καιρόν) and 4.71.3 (παρήγγελλε τοῖς Μακεδόσιν ἅμα τῷ φωτὶ πᾶσιν ἀριστοποιεῖσθαι καὶ διεσκευασμένους ἑτοίμους ὑπάρχειν). It is true that διεσκεδασμένους occurs in Aen.Tact. 11.11; however, its sense there (in a description of a politically-driven constitutional reform at Herakleia Pontica) is of a scattering/dispersal that is not at all beneficial to, or sought by, those being scattered – as indeed is often the case with this verb. (For a parallel which might offer some support for retaining the paradosis here in Ph. see, nevertheless, Xen. *Hell.* 7.1.21 on the tactical effectiveness of the c.50 cavalrymen sent by Dionysius I in 369, to help his allies the Spartans defend Corinth against Epaminondas: διεσκεδασμένοι ἄλλος ἄλλῃ παραθέοντες ἠκόντιζον τε προσελαύνοντες κτλ.)

Banal as it is, this passage with its distinction between 'the hoplites' (again D13.3–4 [*97.43–44*], specifically of metic hoplites) and 'the light-armed' is the only insight Ph. anywhere gives into the internal organization of the armed forces he expects besieged cities to muster. (The relative clause here is taken by all translators and commentators to refer to both categories.) Arming, at public expense, those

citizens not in a position to arm themselves (C27 [*93.3–4*]) will presumably have allowed the city's generals to maintain both troop-types at what were considered their optimal levels.

C44.6–8 [*94.18–20*] **ἵνα ταχὺ καὶ εὐτάκτως ποιῶσι τὸ προσταττόμενον τῷ στρατηγῷ** ('in order that they may do what the general assigns to them quickly and in good order'). Speed as a virtue of military and military-related tasks is a feature of Ph.'s thinking throughout the treatise: cf. A19.5–6 [*81.4–5*], A64.5 [*84.28*], B51.4 [*90.8*], B53.9–11 [*90.22–24*], C20.2–3 [*92.30–31*], C33 [*93.29–32*], C43 [*94.12–13*], C50 [*94.34–35*], C72.7–10 [*96.21–24*], D17.3–4 [*98.6–7*] and D86.1–3 [*103.12–14*]. Occasionally, though, another attribute is paired with it. At A64.5 [*84.28*] the phrase ἵνα εὐεργῶς καὶ ταχὺ ἐργάζωνται (if that is the correct reading there: see the Comm. thereto) links with speed a concept drawn, apparently, from abstract philosophy. In the present passage, by contrast, ταχὺ καὶ εὐτάκτως is a phrase redolent of soldierly vocabulary itself (cf. e.g. Xen. *Anab.* 6.6.35 on Cleander the Spartan harmost of Byzantium: ἐπεὶ δὲ καὶ ἑώρα αὐτοὺς τὸ παραγγελλόμενον εὐτάκτως ποιοῦντας, καὶ μᾶλλον ἔτι ἐπεθύμει ἡγεμὼν γενέσθαι αὐτῶν), and indeed, more broadly, of the sort of language used in order to praise and reward it. Garlan 386 n.44*b* notes the role of *eutaxia* in military-related honorific decrees on stone in the Hellenistic era. See also Pritchett, *War* 2.236–238; Whitehead, 'Cardinal Virtues' 70; Chaniotis, *War* 23, 49–51, 53, 92, 93.

C45–48 [94.20–31]: sustaining morale

Schoene wondered whether this whole sub-section was misplaced and should belong, instead, after C71 [*96.13–15*]. In my opinion, that context does seem more apt than this one; nevertheless the suggestion has not convinced any of his successors to make the transposition.

C45.1–3 [*94.20–22*] **Τοὺς δὲ γινομένους τραυματίας τῶν ξένων ἐπιμελῶς θεραπεύειν πάντα τὰ δέοντα παρασκευάζοντας** ('When there are wounded amongst the foreigners, look after them carefully by preparing everything that is needed'). The 'wounded' (*traumatiai*) of an army or the like feature prominently, and unsurprisingly, in war-narratives from Herodotus (3.79.1) and Thucydides (7.75.3, 8.27.4) onwards. In Ph. the idiom γινομένους τραυματίας will reappear at C72.6–7 [*96.20–21*], οἱ στρατιῶται τραυματίαι γενόμενοι. Elsewhere he prefers verbs, τραυματίζειν or τιτρώσκειν: see A9.4 [*80.14*], A20.8 [*81.13*], A22.3 [*81.27*], A32.6 [*82.11*], A32.7 [*82.12*], B53.10 [*90.23*], C2.4 [*91.1*], C18.4–5 [*92.25–26*], C63.3–4 [*95.34–35*], D39.4 [*99.44*] and D66.5 [*101.35*].

Diels-Schramm 60 construe *xenoi* here as 'Söldner'; and Garlan, while translating 'étrangers' (312), comments (386 n.45*a*) that '[i]ci, Philon désigne expressement les mercenaires du nom de ξένοι: la suite de la phrase explique pourquoi il était important de souligner, en cette occasion, l'origine étrangère des mercenaires'. In fact the point receives extra corroboration from C72.6–7, quoted above.

See further under the next lemma.

C45.3–5 [*94.22–24*] **ὅσοι ἂν μὴ ἔχωσιν αὐτῶν τοὺς θεραπεύοντας, εἰς τὰς τῶν πολιτῶν οἰκίας διδόναι** ('place in the houses of the citizens any who do not have people of their own looking after them'). It will emerge in C47.2–4 [*94.27–29*] that Ph. expects some mercenaries to have brought their families with them, but the phraseology of the two passages (ὅσοι ἂν μὴ ἔχωσιν αὐτῶν τοὺς θεραπεύοντας here, ἐὰν καταλίπωσιν ἑαυτῶν τέκνα ἢ γυναῖκας there) does not reveal whether he considers either scenario more normal than the other.

The provision for wounded mercenaries here has a precedent in Xen. *Anab.* 7.2.6: at Byzantium Cleander (see C44 under **ἵνα**) 'had not sold any (of Cyrus's soldiers) but, out of pity, was looking after the sick ones and insisting that they be taken into people's houses' (οὐδένα ἐπεπράκει, ἀλλὰ καὶ τοὺς καμνόντας ἐθεράπευεν οἰκτίρων καὶ ἀναγκάζων οἰκίᾳ δέχεσθαι). But whether accompanied by dependents or not, are the mercenaries here in Ph. to be envisaged as quartered in private houses under normal circumstances (as advocated in Aen.Tact. 12.1 and 13.3; and cf. also Polyaen. 2.30.1, as interpreted by Burstein, *Outpost of Hellenism* 51 with n.34)? Garlan 386 n.45*c* thinks not ('Ils pouvaient donc, en temps ordinaire, ne pas loger chez l'habitant'), despite having suggested the opposite in his note (384 n.30*a*) on C30.7–11 [*93.17–21*] ('Les mercenaires paraissent avoir été logés … dans les ἄμφοδα, sans doute chez les particuliers'). Ph. nowhere provides us with a basis for clarifying his thinking on the matter.

C46.1–3 [*94.24–26*] **ὅσοι ἂν ἄνδρες ἀγαθοὶ γίνωνται, ἀναβιβάζειν χώραν καὶ ἡγεμονίαν διδόναι καὶ στεφανοῦν** ('for those who behave as brave men, advance their position and give them a command and crown them'). On *andres agathoi* in Ph. – whether, after behaving as such, they are now dead or (as here) still alive – see A86 under **Δεῖ δὲ καί**.

The phrase ἀναβιβάζειν χώραν has given rise to differing interpretations. A very similar recommendation in D13.2–3 [*97.42–43*] has the soldier himself being advanced: τὸν δὲ στρατιώτην ἀναβιβάσειν. The co-existence of both idioms in the same work is acceptable to some (Arnim, *Index* 4; LSJ s.v. ἀναβιβάζω, 7) but not, evidently, to Diels-Schramm 61, who print a small but ingenious supplement here: ἀναβιβάζειν <καὶ> χώραν καὶ ἡγεμονίαν διδόναι, 'befördern und ihnen Landbesitz und Führerstellung geben'. As Garlan 386–387 n.46*b* comments, the scenario created thereby can derive support from (e.g.) Diod.Sic. 19.25.3 (Antigonus in 317 promises land-grants to Macedonian troops: χώραν πολλὴν δώσειν), but that falls short of a compelling argument to emend the text here; χώρα as military rank is paralleled in Plb. 1.43.1 (τῶν ἡγεμόνων τινὲς τὰς μεγίστας χώρας ἐχόντων).

Ph.'s other two suggestions here are unproblematic. For ἡγεμονίαν διδόναι cf. e.g. Diod.Sic. 13.96.1 (Dionysius I of Syracuse: τοῖς πιστοτάτοις τὰς ἡγεμονίας παραδιδούς) and 16.52.4 (Mentor of Rhodes: παραδιδοὺς αὐτοῖς τὰς ἐπιφανεστάτας ἐν τοῖς στρατιωτικοῖς ἡγεμονίας). For giving mercenaries (or other troops) a garland or crown cf. e.g. Xen. *Anab.* 1.7.7 (Cyrus the Younger: ὑμῶν δὲ τῶν Ἑλλήνων καὶ στέφανον ἑκάστῳ χρυσοῦν δώσω), Diod.Sic. 20.94.5 (the Rhodians in 304 and their mercenary commander Athenagoras of Miletos: τὸν δ' Ἀθηναγόραν ἐστεφάνωσαν χρυσῷ στεφάνῳ καὶ δωρεὰν ἔδωκαν ἀργυρίου τάλαντα πέντε, σπεύδοντες καὶ τῶν ἄλλων μισθοφόρων καὶ ξένων ἐκκαλεῖσθαι τὴν πρὸς τὸν δῆμον

εὔνοιαν), Plb. 5.60.3 (Antiochus III: δωρεὰς μεγάλας καὶ στεφάνους ἐπ᾽ ἀνδραγαθίᾳ καὶ τοῖς ἰδιώταις καὶ τοῖς ἡγεμόσι προκηρύξας), Arr. *Anab.* 7.10.3 (Alexander: στέφανοί τε χρυσοῖ τοῖς πλείστοις ὑμῶν εἰσι μνημεῖα τῆς τε ἀρετῆς τῆς ὑμετέρας καὶ τῆς ἐξ ἐμοῦ τιμῆς ἀθάνατα). A lacunose section (block A col.3) of the Macedonian army regulations from Amphipolis (ISE 114: C28 under **<ἐν> αἷς**) apparently assigns a double share of booty to those who have received *stephanoi*. See generally Pritchett, *War* 2.276–290, esp. 289–290; and for Roman practice see also D9 under **ἐπικηρύξας**.

C47.1–2 [*94.26–27*] **ἐάν τινες τελευτήσωσιν, θάπτειν ὡς λαμπρότατα δημοσίᾳ** ('if any die, bury them as lavishly as possible at public expense'). Compare e.g. Diod.Sic. 17.21.6 on Darius III's treatment of his war-dead after the Battle of the R.Granicus (τοὺς τελευτηκότας ἔθαψε μεγαλοπρεπῶς, σπεύδων διὰ ταύτης τῆς τιμῆς τοὺς στρατιώτας προθυμοτέρους κατασκευάσαι πρὸς τοὺς ἐν ταῖς μάχαις κινδύνους), and generally Onas. 36.1–2, urging prompt and proper care for the dead (τῶν νεκρῶν κηδεία), both for its own sake and as reassurance to the surviving soldiers that their own death in service will not be ignored. Within Ph.'s own thinking, the present passage's concern for deceased mercenaries is a companion-piece to A86 [*86.13–18*] (q.v.), where the honoured dead are citizens buried in their native soil (τελευτήσαντες ἐν αὐτῇ τῇ πατρίδι).

C47.2–4 [*94.27–29*] **ἐὰν καταλίπωσιν ἑαυτῶν τέκνα ἢ γυναῖκας, πολυωρεῖν μὴ παρέργως** ('if they leave behind their children or wives, be systematically solicitous'). On the (unquantifiable) likelihood that the besieged city's mercenaries have brought their families with them, see already C45 under **ὅσοι** (and further under the next lemma). Chaniotis, *War* 113 notes here that 'the question of status is of fundamental importance. Most warriors were men of some means (see chapter 2), and consequently the widows of war dead usually belonged to the better-off families and were taken care of by their next of kin'. I would only add the proviso 'if any': Ph.'s advice here actually seems to address a situation where it is necessary for the city itself to step in. See generally Pomeroy, *Women* 98–103, at 102.

One of the earliest attestations of the verb πολυωρεῖν is in Aen.Tact. 22.17: his advice there to have untrustworthy guards celebrate festivals in their own homes is aimed at removing any threat they pose while leading them to think that they are being given special consideration (ἅμα μὲν πολυωρεῖσθαι δοκοῦσιν, ἅμα δὲ οὐδὲν ἂν ἐπ᾽ αὐτοῖς εἴη πρᾶξαι). Classical-period instances also include Aristot. *Rhet.* 2.1378b35–36: 'men think they have a right to be treated solicitously by those who are their inferiors in birth, power, excellence, etc.' (προσήκειν δ᾽ οἴονται πολυωρεῖσθαι ὑπὸ τῶν ἡττόνων κατὰ γένος, κατὰ δύναμιν, κατ᾽ ἀρετήν, κτλ). Beyond that, however, Garlan 387 n.47*b* justifiably dubs πολυωρεῖν 'un mot typique du vocabulaire hellénistique'. The various dossiers of evidence he cites there – chiefly: Welles, *Royal Correspondence* 355; J. & L. Robert, *BE* 1944 no.132 – are now subsumed under and expanded by P. Charneux, 'En relisant les décrets argiens (II)', *BCH* 115 (1991) 297–323, at 299–302. In this instance the document Charneux revisits is the third-century Argive decree of proxeny for Agathocles of Athens that he had published in *BCH* 77 (1953) 387–403, at 387–392 (by a slip Garlan credits

the article to Robert), with its opening clause ἐπειδὴ Ἀγαθοκλῆς Νικοστράτου Ἀθηναῖος πολυωρῶν διατελεῖ τᾶς πόλιος τῶν Ἀργείων καὶ … εὔχρηστός ἐστι ἐν ἅπαντι κ̣αι̣ρῶι πολυωρῶν ἕκαστον καὶ κοινᾶι τε καὶ [ἰδ]ίαι. In all, vocabulary of this kind is either securely present or plausibly restorable in more than a dozen such Hellenistic inscriptions.

To the present instance of πολυωρεῖν Ph. adds the adverbial qualifier μὴ παρέργως (attested from the second half of the fourth century onwards). Though its precise flavour varies between one context and another, the general thrust is of an undeviating policy or state of mind; cf. e.g. Plat. *Leg.* 7.793E, where (on the rigour needed in training the under-threes in Magnesia) it is appended to ἀκριβῶς.

C48.1–3 [*94.29–31*] **μάλιστα γὰρ οὕτως εὔνοοι γινόμενοι τοῖς στρατηγοῖς καὶ τοῖς πολίταις ἄριστα ἂν κινδυνεύσειαν** ('for thus, especially well-disposed towards the generals and the citizens, they would fight as best they can'). As Garlan 387 n.48*a* points out, what Diod.Sic. 17.21.6 says about Darius III (quoted at C47 under **ἐάν τινες**) uses language very like this. The only significant difference, in fact, is Ph.'s invocation, here only, of the concept of *eunoia*, that valuable attribute (Whitehead, 'Cardinal Virtues' 52–54, 63–67) which in a military context is tantamount to loyalty. Besides numerous instances in the historians which, again, relate to specific individuals (e.g. Plb. 3.13.8 on Hannibal; Diod.Sic. 17.65.4 and 17.94.3–4 on Alexander; Diod.Sic. 18.40.4 on Antigonus), compare generally Xen. *Hipp.* 6.2: 'so this is how feelings of *eunoia* towards the commander on the part of his men are likely to come about – when he is kind to them and is manifestly giving thought in advance to how they will be fed and how they will withdraw safely and rest securely' (Εὐνοϊκῶς μὲν οὖν ἔχειν καὶ ἐκ τῶνδε εἰκὸς τοὺς ἀρχομένους, ὅταν φιλοφρόνως τε ἔχῃ πρὸς αὐτοὺς καὶ προνοῶν φαίνηται, ὅπως τε σῖτον ἕξουσι καὶ ὅπως ἀσφαλῶς μὲν ἀποχωρήσουσι, πεφυλαγμένως δὲ ἀναπαύσονται).

Ph.'s rationale here for respectful treatment of dead soldiers – its tonic effect on the morale of living ones – is paralleled in Onas. 36.1–2.

On C45–48 [*94.20–31*] as a whole, the *locus classicus* is still the document cited by Garlan, 'Cités' 25 n.35, reiterated Garlan 387 n.47*c*: OGIS 266 (Staatsverträge 481; translations Bagnall/Derow^2 no.23, Austin^2 no.230), a sworn agreement between Eumenes I of Pergamum and his mercenaries, after their revolt, during the mid-third century (c.263–241); amongst its numerous provisions is a short clause (lines 8–9) – obscure, alas in its precise import – 'concerning orphan-matters' (ὑπὲρ ὀρφανικῶν). See further Chaniotis, *War* 66, 86–88 (with a translation of clauses i–vii).

C49–50 [94.31–35]: tactic against an enemy attacking uphill

C49.1–3 [*94.32–34*] **Ἐὰν δὲ ὁ τόπος καθ᾽ ὃν προσβάλλουσι κατάντης ᾖ, ἀφετέον ἐστὶ τοὺς τρόχους δρέπανα ἔχοντας ἢ λίθους μεγάλους** ('If the place at which (the enemy) are attacking is downhill (from the wall), wheels equipped with scythes should be released, and large stones'). For 'downhill' places cf. e.g. Xen. *Hell.* 4.8.37 (ἐν τῷ κατάντει); Diod.Sic. 1.32.8 (= Agatharchides FGrH 86 F19.22–23) and figura-

tively in 12.12.3. A well-positioned city wall would of course have as much of its circuit as possible higher – or at least not lower – than the immediate surroundings.

Garlan 387 n.49*a* comments, on the phrase τοὺς τρόχους δρέπανα ἔχοντας, that '[l']utilisation de l'article prouve que ces engins, qui ne sont guère mentionnés par les historiens, étaient bien connus des ingénieurs hellénistiques'. (His basic point is probably sound, though not (in my opinion) as a deduction from Ph.'s use of the definite article, which is unsystematic throughout the whole treatise.) The problem, from the aggressors' standpoint, of things being rolled downhill onto them is alluded to in Athen. Mech. 37.4–8 and Apollod. Mech. 139.9–13, but neither of them mention Ph.'s scythe-bearing wheels; Athenaeus writes of 'enormous stones and large column-drums and other such things', while Apollodorus lists 'logs of timber, or round stones, or wagons carrying weights, or round vessels packed with gravel or with earth'. Note also D.C. 56.14.1 on the Dalmatians' defence of Andetrium against the Romans in 9 CE: from their elevated position they let loose not only stones but also 'wheels … [and] entire wagons full of rocks … [and] circular chests, constructed in the local way and packed full of stones'.

For rolling down rocks cf. also e.g. Xen. *Hell.* 3.5.20, where the Spartans rally in the mountains after their defeat at the battle of Haliartos in 395 (ἐπὶ τοὺς λοιποὺς ἐπεκυλίνδουν πέτρους εἰς τὸ κάταντες καὶ πολλῇ προθυμίᾳ ἐνέκειντο); Xen. *Anab.* 4.2.3, 4.2.20.

C50.1–2 [*94.34–35*] **οὕτω γὰρ ἂν τάχιστα καὶ πλείστους διαφθείραις τῶν ἐναντίων** ('for that is how you might destroy the greatest number of the enemy most quickly'). Athenaeus and Apollodorus (see under the preceding lemma) mention other methods, without making any attempt to rank them.

Schoene suggested this – i.e. immediately after C50 [*94.34–35*] and before the new topic broached in C51 [*94.36–40*] – as a more suitable place to locate C63–71 [*95.32–96.14*]. Again, none of his successors has been sufficiently convinced to effect the transposition.

C51–62 [94.36–95.32]: defence against seaborne assaults

C51.1–2 [*94.36–37*] **Ἐὰν δὲ ἐκ θαλάσσης ἡ προσαγωγὴ συντελῆται, κτλ** ('If the (enemy) approach is effected from the sea, etc.'). The proviso is clearly expressed and textually secure, but substantively mysterious insofar as it relates to C51 [*94.36–40*]. (C52–62 [*94.40–95.32*] are another matter.) What is recommended here would be likely to be no less effective against a terrestrial attack. (C62 [*95.29–32*], for practical purposes, acknowledges the point.) See further under the next lemma.

Broadly speaking, the topic of making preparations against a seaborne enemy invasion is in the tradition of Aen.Tact. 8.2, a summary of matters dealt with fully, we are told, in the author's *Paraskeuastikê biblos*; but this comes immediately after 8.1's similar summary of how to prepare for an incursion by land, and it may be that processes of compression and epitomization in Ph. have sacrificed material that originally expanded what follows in this chapter.

The noun προσαγωγή – with a meaning of 'approach' (or access) in the sense of hostile attack – is also used in C59.3 [*95.22*], C62.3–4 [*95.31–32*], D17.2–3 [*98.5–6*], D18.1–2 [*98.13–14*] and D21.1–2 [*98.24–25*]. On D29.3–4 [*99.8–9*] see the Comm. thereto

C51.2–3 [*94.37–38*] **θύρας τε κρυπτὰς ἥλους ἐχούσας δεῖ τιθέναι** ('it is necessary to position … concealed doors which have (protruding) nails'). Though it is nothing to do with a seaborne attack, Diod.Sic. 18.71.3–4 recounts a prime instance of this tactic from 318, where Damis at Megalopolis counters Polyperchon's elephants in this way: 'after studding many large doors with sharp nails, burying them in shallow excavations and concealing the projecting spikes, he left a way into the city through them and placed none of his troops directly in front of it but stationed on the flanks a mass of javelin-throwers and archers and artillery. (4) As Polyperchon was clearing the whole area of the breach [in the wall: see 70.5–7] and making his attack through it with all the elephants, an unexpected thing happened to them, when they encountered no face-to-face resistance: the Indians were forcing them to rush into the city, but the elephants as they charged violently encountered the spiked doors' (Θύρας γὰρ μεγάλας πλείονας ἥλοις ὀξέσι καταπυκνώσας καὶ ταύτας ἐν ὀρύγμασι ταπεινοῖς κατατρώσας καὶ τὰς ἐξοχὰς τῶν κέντρων ἐπικρυψάμενος κατέλιπε διὰ τούτων δίοδον εἰς τὴν πόλιν καὶ κατὰ μέτωπον μὲν οὐδένα τῶν στρατιωτῶν ἔστησεν, ἐκ δὲ τῶν πλαγίων ἔταξε πλῆθος ἀκοντιστῶν καὶ τοξότων καὶ τῶν καταπελτικῶν βελῶν. (4) Τοῦ δὲ Πολυπέρχοντος ἀνακαθαίροντος πάντα τὸν τόπον τοῦ πτώματος καὶ τοῖς θηρίοις ἀθρόοις διὰ τούτου τὴν ἔφοδον ποιουμένου παράδοξος ἐγένετο πρᾶξις περὶ τοὺς ἐλέφαντας. οὐδενὸς γὰρ ἀπαντῶντος κατὰ στόμα τοῖς θηρίοις οἱ μὲν Ἰνδοὶ συνηνάγκαζον εἰσπίπτειν εἰς τὴν πόλιν, οἱ δ' ἐλέφαντες τῇ ῥώμῃ προπίπτοντες ἐνέπιπτον εἰς τὰς κατακεκεντρωμένας θύρας). Compare generally with this Diod.Sic. 19.83.2 (and 84.2–4), on the anti-elephant *charakes* – an application of that noun missed by LSJ s.v., but see R.M. Geer in the Loeb edition ad loc. – used by Ptolemy at the battle of Gaza, 312; also D.C. 40.40.5–6 on the 'hidden trenches' filled with stakes installed by Julius Caesar as part of his siege of Alesia in 52.

For nails in conventional construction (i.e. with their heads rather than their points showing) in Ph., see *Bel.* 63.47 and 64.20, and the verb συνηλοῦν at 57.26, 57.34 and 64.2.

C51.3–4 [*94.38–39*] **τριβόλους καὶ σιδηροῦς καὶ πυξίνους διασπείρειν** ('to spread *triboloi* of both iron and boxwood'). On *triboloi*, of this kind and others, see A79 under **οἱ τρίβολοι**. The type in question here – caltrops, in effect – are mentioned again in D44 [*100.6–11*] (advice to the attackers on how to locate and remove them); see also e.g. Polyaen. 1.39.2 (Nicias at Syracuse in 415) and 4.3.17 (Darius III at 'Arbela' [Gaugamela] in 331), and generally Rihll, *Catapult* 7–8. In Plb. 33.19 (preserved by Plut. *Mor.* 200A-B) the historian himself features in an anecdote involving, as here in Ph., a seaborne attack: at Carthage in 147, Polybius (fruitlessly) advises Scipio Aemilianus to prevent the defenders from wading across to attack the mole by 'strewing it with iron *triboloi* or throwing in spiked planks' (κατασπεῖραι τριβόλους σιδηροῦς ἢ σανίδας ἐμβαλεῖν κεντρωτάς).

On boxwood, prized for its strength, cf. *Bel.* 62.12, 66.41, 67.1, and see generally Orlandos, *Matériaux* I 18; Meiggs, *Trees* 280–282. Lawrence 96 reasonably supposes that Ph.'s *triboloi* here employ boxwood as 'an alternative, not an adjunct, to iron'. (Brinkmann ap. Schoene tentatively proposed deleting the καί before σιδηροῦς, but no editor has done so; and the substantive point is the same either way.)

C51.5 [*94.40*] **ἀποχαρακοῦν τοὺς εὐεπιβάτους τόπους** ('to close off the easily-accessible places with palisades'). On palisading see generally A37 under **αἱ δὲ χαρακώσεις**.

Ph.'s compound verb here is uncommon, but cf. e.g. Polyaen. 2.1.25 (facing an invasion by the Spartans under Agesilaus, the Thebans dug a long trench and closed it off with palisades, ἀπεχαράκωσαν, save for a narrow passage at each end); Plut. *Pomp.* 35.1 (in pursuit of Mithradates VI, Pompey has difficulty crossing a river ἐπὶ πολὺ σταυροῖς ὑπὸ τῶν βαρβάρων ἀποκεχαρακωμένον). The same idea is more commonly expressed by the verb ἀποσταυροῦν, as in e.g. Thuc. 4.69.2, 6.101.2, 7.80.6; Xen. *Anab.* 6.5.1, *Hell.* 7.4.32; Plut. *Arat.* 40.7; App. *BC* 1.118; and (again a particularly noteworthy instance for present purposes, as it envisages a seaborne attack) Plb. 4.56.8: the people of Sinope, expecting to be besieged by Mithradates II in c.220, 'set about strengthening in a circuit the sea-washed part of the promontory, staking off and palisading-around the embarcation-points from the sea, and at the same time positioning artillery and troops at those places which were suitable' (ἐπεβάλοντο τῆς χερρονήσου κύκλῳ τὸ νησίζον ὀχυροῦν, ἀποσταῦροντες καὶ περιχαρακοῦντες τὰς ἐκ θαλάττης προσβάσεις, ἅμα δὲ καὶ βέλη καὶ στρατιώτας τιθέντες ἐπὶ τοὺς εὐκαίρους τῶν τόπων).

For εὐεπίβατος cf. e.g. Polyaen. 6.5: Aratus's capture of Akrocorinth in 243 exploits a place where the wall was χθαμαλὸν καὶ εὐεπίβατον.

C52.1–3 [*94.40–42*] **Τὰ δὲ στόματα τῶν λιμένων φράττειν ἰμητοῖς κλείθροις** ('Fence in the mouths of the harbours with strung-out barriers'). Immediately before the noun κλείθροις here the manuscripts transmit μὴ τοῖς. Schoene noted four suggestions for remedying this obvious corruption – delete μή (Thévenot, marginal note); emend to μὲν τοῖς (Haase); emend to σιδηροῖς (Miller); emend to τμητοῖς ('cut, shaped by cutting': LSJ s.v.), (Buecheler) – but preferred his own solution [μ]ὴ τοῖς. Diels's ἰμητοῖς, printed in Diels-Schramm 62 and Garlan 313 (and accepted also, evidently, by Lawrence 97 and W.M. Murray, *Age of Titans* 291), is attractive but relies on a word otherwise attested only in lexicography (Hesychius ι 635, etc.).

Though some cities had more than one harbour, the plurals in the phrase τὰ στόματα τῶν λιμένων are generalizing ones, as again at D55.5 [*100.43*] (<τὰ ἀντλητήρια> οἷς ἀνακαθαίρουσι τοὺς λιμένας). Otherwise Ph. always mentions a singular harbour (C56.3–4 [*95.11–12*], D5.4–5 [*96.40–41*], D22.1–2 [*98.27–28*], D101.2 [*104.2*]) and its singular 'mouth' (C56.1 [*95.9*], D101.2 [*104.2*]). (The idiom is especially favoured by Thucydides: see 7.4.4, 7.22.2, 7.36.6, 8.90.4, 8.94.3.) Ph.s verb φράττειν – applied to barriers of other kinds in B10.4–5 [*87.5–6*], D17.4–5 [*98.7–8*] and D101.3–4 [*104.3–4*] – is taken up by the cognate noun φράγμα in D23.1–2 [*98.31–32*]; cf. Aen.Tact. 8.2.

A harbour barrier (or boom), specifically, is mentioned again at C55.1–2 [*95.5–6*], D22.1–2 [*98.27–28*] and D23.1–2 [*98.31–32*]; in the Greek, singular and plural seem to be interchangeable (*pace* LSJ s.v. κλεῖθρον I.2). The best-attested instance of such a thing comes from Athens (Peiraieus), from 429/8 onwards: Thuc. 2.94.4 (ἐποιοῦντο λιμένων τε κλήσει καὶ τῇ ἄλλῃ ἐπιμελείᾳ), cf. Diod.Sic. 12.49.5 (τὸν δὲ Πειραῖα κλείθροις … διαλαβόντες ὠχύρωσαν; Athen. *Deipn.* 12.535D; IG ii^2 244 (Maier no.10) lines 40–41, partially restored; Diod.Sic. 18.64.4; Garland, *Piraeus* 29 with 182–183. Other examples are known at Chios (Aen.Tact. 11.3), Tyre when facing Alexander (Arr. *Anab.* 2.24.1: southern harbour with, northern without), Syracuse (Front. *Strat.* 1.5.6 – though Zonaras 8.16 places this episode from 260 in Libya) and elsewhere; see Garlan 388 n.52*b*. Garlan comments there that the term κλεῖθρον/κλεῖθρα can sometimes apply broadly to a pair of moles situated on either side of the mouth, and it is also true that the barrier mechanisms themselves come in more than one sort of design (see generally K. Lehmann-Hartleben, *Die antiken Hafenanlagen des Mittelmeeres*, *Klio* Beiheft 14 (1923) 65–74; M.H. Jameson, 'Excavations at Porto Cheli and vicinity, Preminary Report I: Halieis 1962–1968', *Hesperia* 38 (1969) 311–342, at 335–336, on the closure of the harbour at Halieis by, apparently a pivoting beam; W.M. Murray, *Age of Titans* 135–137); nevertheless, the system most commonly referred to involves chains. (Ph. does not use that term, except, in a quite different context, at D53.1–2 [*100.33–34*].)

See further under the next lemma.

C52.3–4 [*94.42–43*] **ἐν οἷς <χῶναι> εἰσι περιτρέχουσαι καὶ στρογγύλαι, σιδηροῦς δὲ κόλπους ἔχουσαι** ('on which there are <buoys>, rotating and spherical, which have iron hollows'). The paradosis here omits a feminine noun in the nominative plural. Schoene simply marked a lacuna (and mentioned no conjectures). As in the earlier part of the sentence (see under the preceding lemma), Diels's suggestion <χῶναι>, printed in Diels-Schramm 62, is also accepted by Garlan 313 and Lawrence 96–97. W.M. Murray, *Age of Titans* 291 n.24 declares himself unconvinced by <χῶναι> but does not offer an alternative. (On this matter see further below.)

Vocabulary apart, the substance of what Ph. may have had in mind here is depicted in Diels-Schramm 61 fig.28: the floating buoys suspend the chain barrier horizontally; further chains (not expressly mentioned by Ph.) anchor each buoy vertically to the sea-bed below. Garlan 388 fig.67 reproduces this illustration unchanged, despite describing it as 'assez fragile'. His concerns are left unexplained, but for my part I would venture to doubt whether the vertical chains are a convincing interpretation of Ph.'s phrase σιδηροῦς δὲ κόλπους ἔχουσαι. W.M. Murray, *Age of Titans* 291 fig.E.1 may therefore be right to dispense with the vertical chains and have the principal, horizontal one pass through the centre of barrel-shaped buoys that are 'something like a large version of the floats used on lane markers in a swimming pool. If this is what Philo intended, the hollow could be defined as the iron tube through which the barrier or κλεῖθρον – in this case, a chain – was led, much as the line for the swim lane is passed through the center of the float. The float itself might be constructed out of wood in the manner of a large barrel, and thus require a pitch sealant (as in Aen.Tact. 11.3)'.

J. M. Spieser, 'Philon de Byzance et les fortifications paléochrétiennes' [A81 under **καὶ τοῖς πολεμίοις**], at 366–368, cites a parallel passage from the *Miracula Sancti Demetrii* (II.1.182–184, esp. 183), on the Slavic attack on Thessalonica in 614 CE: καὶ κατασκευάσαι τινὰς ἐκ ξύλων βάσεις ἐν τῷ λιμένι, ἐν αἷς τὴν ἀπόθεσιν τῆς ἁλύσεως ἐποιήσαντο, καὶ μηροὺς δὲ ὡσαύτως ἐξ ἀναλύτων σιδήρων ἑαυτοὺς ἀμπέχοντας, χιοειδῶς τινας ὀξείας φέροντας ῥάβδους, ἑτέρας δὲ ἡλωτὰς σπαθοειδεῖς ἐκ ξύλων ἐξεστώσας, κτλ. If one accepts this overall equivalence, Ph.'s <χῶναι> are here wooden *baseis*, translated by Spieser as 'bouées', buoys; he does not, however, go as far as to advocate <βάσεις> in Ph. also.

The rest of the *MSD* material is harder to map onto Ph. exactly, Spieser concedes, because of interpretative difficulties in both texts. He first tentatively posits a connection (for reasons obvious enough) between Ph.'s phrase σιδηροῦς δὲ κόλπους ἔχουσαι and μηροὺς ...ἐξ ἀναλύτων σιδήρων ἑαυτοὺς ἀμπέχοντας, but then goes on to suggest that the μηροί might be Ph.'s 'platforms': see the next lemma.

C53.1–3 [*94.43–45*] **ἢ ἐσχάρας ἐπὶ τοῦ τόπου τίθεσθαι καὶ λίθους ὡσεὶ χωστοὺς καὶ μεγίστους ἐπιβάλλειν** ('or position (underwater) platforms at the place and put on them stones as if (for) embankments and large'). For platforms of another kind see already C15.5–6 [*92.12–13*] with the Comm. there. In the present instance one would have welcomed an indication of what these *escharai*, which are to support large stones (below), consist of, and indeed why they are necessary. Garlan 389 n.53*a* (following F. Graefe, 'Kleine Studien zur Marinegeschichte des Altertums', *Hermes* 57 (1922) 430–449, at 441–444) comments that '[c]es coffrages pouvaient être des bateaux immergés', but that risks confusing the issue: such sunken ships, as in e. g. Diod.Sic. 24.1.1 and Liv. 37.14.5–15.2, were a harbour-blocking ploy in their own right, impromptu if necessary, not a secure foundation for a pre-emptive construction of boulders and stakes such as Ph. is advocating here.

Following Rochas d'Aiglun, the orthodox reading (Schoene, Diels-Schramm, Lawrence) of the adjective that belongs with ὡσεί is χιαστούς, a correction in the later manuscripts of an original, meaningless χιστούς. Stones arranged cross-wise or diagonally are not in themselves hard to envisage, but why 'as if' (ὡσεί) so? I have adopted, instead, Garlan's emendation to χωστούς, with its parallel in Plb. 4.61.7 (on the narrow, embanked causeway leading in through lagoons to Ambrakos: στενὴν καὶ χωστὴν ἔχων πρόσοδον). This is also accepted by Spieser (see under the preceding lemma) and, apparently, by W. M. Murray, *Age of Titans* 291: 'a mound of large stones'.

For 'large' stones in this context cf. e. g. App. *Lib.* 573 on Scipio Aemilianus at Carthage: ἔχου δὲ λίθοις μεγάλοις τε καὶ πυκνοῖς, ἵνα μὴ ὑπὸ τοῦ κλύδωνος διαφέροιντο.

C53.3–6 [*94.45–48*] **ἐν οἷς <ἐμπήγνυσθαι> τοὺς καθαρμόττοντας σταυροὺς λοξους σεσιδηρωμένους, ὑπαλλάττοντας ἀλλήλοις καὶ συνδεδεμένους** ('on which <you fix> suitable stakes, slanting (and) ironclad, alternating with each other and bound together'). Schoene saw no need for an explicit verb in this subordinate clause, but Diels's <ἐμπήγνυσθαι> has been accepted by all his successors. (For the verb cf. ἐμπαγῇ in C.66.4 [*95.47*].) On the other hand Diels's emendation of the participle ὑπαλλάττοντας (wrongly nominative in the manuscripts) to ἐπαλλάττοντας seems uncalled-for; I follow Garlan.

This is Ph.'s only mention of *stauroi*, as opposed to his frequent allusions to *charakes*. (Garlan 389 n.53*c* explains the point: '[l]es pieux composant une barrage maritime sont normalement désignés du nom de σταυροί, par opposition aux χάρακες des palissades terrestres'. He cites the instance of Plb. 16.30.1, on Philip V at Abydos in 200, τὰ μὲν ἀποσταυρώσας, τὰ δὲ περιχαρακώσας. See also Plb. 4.56.8, quoted at C51 under **ἀποχαρακοῦν**.)

Diels-Schramm 62 fig.29 (reproduced almost exactly as W. M. Murray, *Age of Titans* 292 fig. E.2), depicts end, side and top views of how this underwater obstruction might have looked. The key point – if correct – is that λόξους σεσιδηρωμένους, ὑπαλλάττοντας ἀλλήλοις καὶ συνδεδεμένους rather clumsily describes a row of paired *stauroi* which slant across each other and have an iron fastening at the point of crossover.

See further under the next lemma.

C53.6–7 [*94.48–49*] **οὐχ ὑπερέχοντας τῆς θαλάσσης ἀλλ' ὅσον παλαιστὴν ἀπολείποντας** ('not protruding above sea-level but at a palm (7.7 cm.) below'). The text appears to be sound, and nobody has questioned it, so here is a theoretician's precision. Even with the minimal tidal changes in the Mediterranean, the degree of normal wind and wave variation will sometimes have exposed the *stauroi* at the surface, sometimes submerged them to a depth below the one specified. Presumably Ph.'s basic requirement is that they are positioned high enough to impede the entry of even the lightest craft.

C54.1–4 [*94.49–95.1*] **πλοῖα ἐναντία πολεμιστήρια ὅπλα ἔχοντα, εἰ δὲ μή, λέμβοι καὶ ὧν ἂν ἔχῃς τὰ λεπτὰ προσορμισθέντα πρὸς ἄλληλα συναρτᾶται** ('ships carrying weapons of war – or if not, *lemboi* and whatever light vessels you may have – anchored opposite (the harbour mouth) are attached to each other'). In Diels-Schramm 62 a finite verb, <ὁρμίζεται> (Diels), is supplied after ἐναντία; I take the majority view that there is no need for it. Likewise, in the phrase λέμβοι καὶ ὧν ἔχῃς κτλ Diels's emendation of λεπτά to πλεῖστα, though supported by Lawrence 96, does not seem warranted; so Garlan 389 n.54*b*. (Garlan has no discussion of the matter beyond that, but since the noun πλοῖα has occurred earlier in the sentence it needed no repeating. Compare generally Plb. 3.43.3, τὰ λεπτὰ τῶν πορθμείων.) The final, finite verb in the phrase is transmitted as συνανασπᾶται ('draw[n] up together': LSJ s. v.), and Schoene was content to retain it; but Schramm's 'correction' to συναρτᾶται is printed in Diels-Schramm 63 and accepted by Garlan 313.

Like W. M. Murray, *Age of Titans* 291, I have left *lemboi* transliterated rather than translated, for lack of an apt English equivalent. Garlan 313 has 'vedettes', and (at 389 n.54*a*) a note to the effect that the very precise usage sometimes found – a type of vessel used by Illyrian pirates – is not applicable in many contexts where a broader sense is needed: 'il s'appliquait à des types très variés d'embarcations à rames, de puissance moyenne, toujours inférieure à celle de la trière, et dépourvues d'éperons'. See generally Casson, *Ships* 395 ('type of galley

used for commerce and war'), with principal discussions at 125–127, 162–163, 335–338. Ph. will mention *lemboi* again, used by the attackers, in D21 [*98.24–26*] and D38 [*99.37–40*].

General scenarios like the one Ph. is catering for here can readily be found in the historians. For instance, Diod.Sic. 13.14.1–2 (elaborating Thuc. 7.59.2–3) describes the Syracusans in 413 closing off their Great Harbour – with the Athenians inside it – with a *zeugma* (Thuc. himself uses the word later in his narrative) consisting of vessels of all kinds bound together by chains. See also e.g. Arr. *Anab.* 2.20.9 (Tyre vs. Alexander in 332). The aggressors too, of course, might make use of such a tactic, as we find in Plb. 14.10.9–12 and the other accounts of Scipio Africanus at Tunes (Tunis) in 203.

C54.4–8 [*95.1–5*] **συμβολαὶ κατασκευάζονται αὐτοῖς δοκῶν παχεῶν τετραγώνων πρὸ τῆς πρῴρας τεθεισῶν, καὶ τούτων συγγομφωθεισῶν καὶ συνδεθεισῶν εἰς τὸ αὐτό, καὶ ἐπ' ἄκρῳ ἐμβόλου περὶ αὐτὰ καθαρμοσθέντος** ('prepared for them are conjunctions of joists thick (and) square (and) placed in front of the prow(s), and with these dowelled together and bound together into one, and a beak fastened on them at the end'). After παχέων Schoene printed the paradosis τεσσάρων, 'four', but the tentative suggested emendation in his apparatus, τετραγώνων, has been adopted by his successors; cf. Diod.Sic. 20.91.2 (and D37.2–3 [*99.33–34*]).

For συμβολή in this sense (C72.8–9 [*96.22–23*] has another) see also D74.4 [*102.22*], and *Bel.* 64.18.

Though no editor or commentator has offered a visual illustration of what Ph. is describing here, its construction and character seem easy enough to picture in general terms. The phrase 'in front of the prow(s)' must mean below water-level; the translation in Lawrence 97 adds a parenthesis to that effect. Of the pair of verbs συγγομφωθεισῶν and συνδεθεισῶν, the second is commonplace enough, in Ph. (cf. already C3.3 [*91.5*] and C53.5–6 [*94.47–48*]) and elsewhere, but the first, more strikingly, betokens the technical procedure (in shipbuilding and elsewhere) of securing joints with *gomphoi*; Casson, *Ships* 223 and passim. (Cf. e.g. Maier no.11 [A14 under **κατάστεγα**], line 77; Diod.Sic. 14.72.5; Plut. *Num.* 9.3, *Mor.* 922B.) See on this point Orlandos, *Matériaux* I 47 with n.2; Garlan 389 n.54*c*; W.M. Murray, *Age of Titans* 292 n.25.

The *embolos* attached to the end of each of these constructions is translated 'ram' by W.M. Murray, *Age of Titans* 292. I have preferred to follow Lawrence 97 in rendering it 'beak', both here and again in C56.4–5 [*95.12–13*] and C59.3–5 [*95.22–24*], so as to leave 'ram' as the term for the (terrestrial) *krios*; nevertheless, Murray must be right on the point of substance (for which see generally Casson, *Ships* 85 in respect of triremes), and also in his comment (292 n.25) that 'only a major naval power would have access to a supply of unused rams for the purpose Philo suggests here'.

C55.1–3 [*95.5–7*] **Παρὰ πάντα τὰ εἰρημένα κλεῖθρα καὶ ζεύγματα καὶ πλοῖα ἀκάτια παρορμείτω** ('Near all the barriers and bridges and ships mentioned, let rowing-boats be at anchor'). Arnim, *Index* 2 construes πλοῖα ἀκάτια here as a two-word phrase, and so, evidently, do Lawrence 97 and W.M. Murray, *Age of Titans* 292 (who both translate 'rowing boats should be anchored beside all the aforesaid booms and pontoon-bridges'); however, given that πλοῖα too have been mentioned already, and as ἀκάτια is adequately attested elsewhere as a free-standing substantive (see below), I judge that Diels-Schramm 63 and Garlan 313 are right to bring πλοῖα within the scope of the opening prepositional phrase. It would be a phrase symmetrically resumptive of, in order, C52 [*94.40–43*], C53 [*94.43–49*] and C54 [*94.49–95.5*] if we could regard the present passage's *zeugmata* as summarizing the substance of C53; since the term more probably, though, relates to what is described in C54 (as φράγματα would have not), the match is less neat than that.

For *akatia* cf. e.g. Thuc. 1.29.3, 4.67.3, Xen *Hell.* 6.2.27, Diod.Sic. 20.86.3 (again under the next lemma), Plb. 1.73.2, Polyaen. 8.46, and see generally Casson, *Ships* 159–160.

C55.3–4 [*95.7–8*] **πίσσαν καὶ θεῖον καὶ τριβόλους ἔχοντα στιππύῳ περιειλιγμένους** ('carrying pitch and sulphur and *triboloi* wrapped in oakum'). The necessary components of incendiary missiles; all three substances should have been stockpiled (see B52 with the Comm. to all three). For *triboloi* of these other kinds see A79 under **οἱ τρίβολοι**.

An instance of *akatia* being deployed by defenders for active fire-raising purposes (rather than simply as tenders of supplies) occurs in Diod.Sic. 20.86.3, on Rhodes in 305; it is described as unsuccessful, however. See also under the next lemma.

C55.4–5 [*95.8–9*] **καὶ ἐν ταῖς ὁλκάσι ταῦτα καὶ <τὰ τοιαῦτα> ἐνέστω** ('and let these and <suchlike> (commodities) also be in the cargo-vessels'). The textual supplement, not thought necessary by Schoene, is Diels's, printed in both Diels-Schramm 63 and Garlan 313.

'Cargo-vessels' (*holkades*: see generally Casson, *Ships* 169 with n.3) will feature again, but on the attacking side, in D21 [*98.24–26*], D23 [*98.31–34*] and D101 [*104.1–6*]. In the present context both Lawrence 97 and W.M. Murray, *Age of Titans* 292 indicate by parenthetical supplements to their translations that in their opinion these vessels are the component parts of a pontoon bridge. I do not agree that that is what Ph. is saying; rather, like the *akatia*, they are located near the barrier *vel sim.*

For defenders deploying cargo-vessels in combat see e.g. Diod.Sic. 13.13.6–7 (Syracuse 413): 'Sicanus the Syracusans' general quickly filled a cargo-vessel with faggots and firebrands, plus pitch, and set fire to the warships which were tossing in the shallows. (7) But although the ships had been set alight, the Athenians quickly extinguished the fire etc.' (Σικανὸς ὁ τῶν Συρακοσίων στρατηγὸς ταχέως ὁλκάδα κληματίδων καὶ δᾴδων, ἔτι δὲ πίττης πληρώσας, ἐνέπρησε τὰς ἐν τοῖς βράχεσι ναῦς κυλινδουμένας. (7) Ὧν ἀναφθεισῶν οἱ μὲν Ἀθηναῖοι ταχέως τήν τε φλόγα κατέσβεσαν κτλ).

C56.1–3 [*95.9–11*] **ἐπὶ τοῦ στόματος [καὶ ἐφ'] ἑκατέρωθεν ἐφεστάτω πετροβόλος εἰκοσαμναῖος** ('at the (harbour-)mouth on either side let a twenty-mina (8.73 kg.) rock-projector be installed'). The deletion is Diels's, printed in Diels-Schramm 63 and Garlan 313. ([καὶ] ἐφεκατέρωθεν Schoene.)

A twenty-mina petrobolos is a calibre otherwise attested only in the theoretical table in *Bel.* 51.38. In context here, its relative lightness is a relevant consideration in the case for retaining the following clause as transmitted – (ἵνα) ὅταν βιάζωνται τῶν μικρῶν τινες εἰς τὸν λιμένα: see the next lemma – rather than adopting Rochas d'Aiglun's suggested emendation to warships (μακρῶν).

C56.3–7 [*95.11–15*] **ἵνα ὅταν βιάζωνται τῶν μικρῶν τινες εἰς τὸν λιμένα, ἐμπρησθῶσιν ἢ περὶ τοὺς ἐμβόλους περιπαγεῖσαι διαφθαρῶσι<ν ἢ> καταποντισθῶσιν τυπτόμεναι τοῖς τε μολιβοῖς ἀμφορεῦσι καὶ τοῖς πετροβόλοις** ('in order that when any of the small (craft) force their way into the harbour they would be set on fire or destroyed after being skewered on the beaks <or> sunk while struck by both lead amphoras and rock-projectors'). W. M. Murray, *Age of Titans* 292 n.27 comments that '[t]he setting on fire of the ships goes with the incendiary materials of the previous sentence, not with the two stone projectors discussed at the beginning of this sentence'. One could, it seems to me, make the point more broadly: Ph.'s ἵνα clause does not flow narrowly from the mention of the pair of petroboloi (which book-end the present chapter) but summarizes a range of anti-ship devices, i.e. retrospectively the 'beaks' of C54.7–8 [*95.4–5*] (see Comm. there under **συμβολαί**) as well as the incendiary possibilities of C55 [*95.5–9*]; prospectively the tactics now to be mentioned, in the phrase 'sunk while struck by both lead amphoras and rock-projectors'.

How then is that last phrase to be understood? Broadly speaking, there are two possibilities: that the petroboloi themselves fire the amphoras, or that Ph. is talking about two separate and distinct weapons.

The first of these interpretations is advanced, *obiter*, by D. B. Campbell in his on-line review (*AJA* 2008) of Rihll, *Catapult*. Campbell complains that Rihll missed (*sc.* at *Catapult* 184–185) an opportunity to juxtapose the present passage of Ph. 'about deploying 20-mina stone projectors around harbors to throw "lead jars" (*Pol.* 3.56= 95.14 Th.)' with what Appian writes about Sulla at Peiraieus in 87: 'from catapults, shooting twenty of the heaviest lead (shot?) simultaneously, he killed many and shook Archelaos's tower and made it insecure' (ἐκ καταπελτῶν, ἀνὰ εἴκοσιν ὁμοῦ μολυβδαίνας βαρυτάτας ἀφιέντων, ἔκτεινέ τε πολλοὺς καὶ τὸν πύργον Ἀρχελάου κατέσεισε καὶ δυσάρμοστον ἐποίησεν: App. *Mith.* 135). However, even though Appian, as we see there, leaves the feminine noun which governs μολυβδαίνας unstated, it would be uphill work to argue that it was anything as rarefied as ἀμφορέας – and indeed hard to see either how (or why) a catapult would fire a jar-shaped projectile. To my mind, therefore, this passage of Appian needs elucidation in its own terms (as indeed Rihll endeavours to provide), and so does Ph.'s phrase here, which does not mean 'sunk while struck by both lead amphoras and (*sc.* the other things fired by) rock-projectors'. Rather, as Garlan 391 n.56*a* has it, the lead amphoras (which Lawrence 96 is wrong, in my view, to describe as 'lead-filled jars') are a separate matter, and they are not fired but vertically dropped. Though referred to as 'amphoras' here, uniquely, they are surely to be identified, as has been generally realised, with what are elsewhere called dolphins (*delphines*), sometimes specified as being made of lead. See in particular the nautical metaphor in Aristoph. *Eq.* 762, τοὺς δελφῖνας μετεωρίζου ('hoist the dolphins'), with a scholion (more fully in Eustathius on Homer, *Iliad* 21.22) which explains the term as a 'contrivance of iron or lead formed into the shape of a dolphin' (σιδηροῦν κατασκεύασμα ἢ μολίβδινον εἰς δελφῖνα ἐσχηματισμένον) and Pherecrates fr.12 K.-A. ('this is a dolphin of lead and a dolphin-carrying lift, which will fall into their (*sc.* ship's) bottom, cut through it and sink it' – ὅδε δὴ δελφίς ἐστι μολιβδοῦς δελφινοφόρος τε κεροῦχος, ὃς διακόψει τοὔδαφος αὐτῶν ἐμπίπτων καὶ καταδύων). Note also e.g. Thuc. 7.41.2–3 (the Athenians at Syracuse in 413 deploy cargo-vessels which have 'dolphin-carrying yardarms', κεραῖαι δελφινοφόροι), Moschion FGrH 575 F1.4 ap. Athen. *Deipn.* 5.208D (Archimedes' *Syrakosia* [see C8 under **<εἰς> σωλῆνα**] has three masts, 'from each of which two stone-carrying yardarms were suspended, from which both grappling-hooks and ingots [*plinthoi*] of lead could be directed against assailants'), and the lead 'weights' (σηκώματα) dropped by the besieged from cranes in Plb. 8.5.8–9 (Syracuse) and 21.27.4 (Ambrakia).

C57.1–2 [*95.15–16*] **Ἐὰν δὲ μέγα τι τὸ διάστημα ᾖ, καὶ πύργος ἐν μέσῳ σταθήτω** ('If the distance (across the mouth) is large, let a tower, too, stand in the middle'). Garlan 391 notes that 'large', in this context, might (by Ph.'s day) extend to the sort of distances exemplified by the 200 m. at Alexandria and the 225 at Attaleia. Perhaps half that would still qualify for his adjective, since so many were smaller. As to what exactly is being recommended here, the 'tower' (Lawrence 97 has 'another tower', which construes καὶ πύργος in such a way as to presuppose two others, housing the pair of petroboloi already mentioned) is either a moveable wooden tower or else and more probably a static stone one. Either way, Ph.'s advice seems to require a small island or mole to be built, to house it, at the mid-point of the harbour mouth. The only way of evading that conclusion would appear to be to assign some other sense to the phrase ἐν μέσῳ.

See further under the next lemma.

C57.2–3 [*95.16–17*] **ἐν ᾧ πετροβόλος ἔστω τριακοντάμνους** ('in which there should be a thirty-mina rock-projector'). That is, one capable of firing 13.1 kg. stones. The manuscripts (PV) transmit the adjective as *four*-mina, τετράμνους, not a calibre too small *per se* (D31.5–6 [*99.17–18*] has a two-mina model) but far too small in this context; cf. e.g. Marsden, *Development* 153 n.2. Schoene noted the problem, citing C67.2–3 [*95.50–51*] (below) for comparison, but had no textual solution to it. Diels's solution, now standard, assumes scribal confusion between the uncial numerals Λ (30) and Δ (4).

Rihll, *Catapult* 162 states that '[t]he 30-mina was evidently recommended for additional range rather than for any additional weight of stone it could launch'. That view loses some cogency if in fact the circumstances which would call for the addition of this larger petrobolos were also circumstances in which the range it would need to cover would be halved (see under the preceding lemma).

For a machine of this size see again at C67–68 [*95.49–96.8*] (with Comm.), and, in the field, Philip V's pair of them (supporting a *talantiaios*) brought against Echinos in 211 (Plb. 9.41.8: τρεῖς ἦσαν βελοστάσεις λιθοβόλοις, ὧν ὁ μὲν εἷς ταλαντιαίους, οἱ δὲ δύο τριακονταμναίους ἐξέβαλλον λίθους).

C58.1–4 [*95.17–20*] **πρὸς δὲ τὰ προσαγόμενα <μηχανήματα> καὶ τὰς προσπλεούσας ναῦς μάλιστα δεῖ χρᾶσθαι τοῖς πετροβόλοις καὶ τοῖς πυροφόροις καὶ τοῖς δορυβόλοις** ('and against the <machines> being deployed and the ships approaching it is necessary to use rock-projectors and (catapults which fire) incendiaries and spear-projectors'). The supplement is Rochas d'Aiglun's, printed in Diels-Schramm 63 and Garlan 314, and accepted also by W.M. Murray, *Age of Titans* 294. Schoene, tacitly followed by Lawrence 97, marks a lacuna. With some misgivings I have accepted the majority view. Its main support, a strong one, derives from identical phrases in A3.4–5 [*79.14–15*], A21.4–5 [*81.18–19*], A50.2 [*83.31*], A57.2–3 [*84.2–3*] and (in the singular) C64.1 [*95.36*]; on the other hand, only the present passage is dealing with a *seaborne* attack, and plenty of other things besides machines can be 'deployed' in Ph., including cargo-vessels at D23.4 [*98.34*]. If one wanted another neuter plural noun for the present context, my suggestion would be <πλοῖα>, taking up C54.1 [*94.49*] and C55.3 [*95.7*] and standing in opposition here to ναῦς, the latter understood specifically as warships. Alternatively, if there truly was a mention of enemy 'machines' here, it is in effect a pre-echo of D21 [*98.24–26*]: 'if you are making a sea-borne attack, do so by putting machines on your cargo-vessels and *lemboi*'.

Of the three counter-measures recommended, the rock-projectors refer back to C56–57 [*95.9–17*]; the other two now appear for the first time in this context. On πυροφόροι see C12 under **Ἐὰν δέ**. But 'spear-projectors' are a great rarity, otherwise mentioned only by Joseph. *AJ* 9.221 (and the reproduction of that passage in the *de virtutibus et vitiis*), as allegedly – the claim goes anachronistically far beyond anything warranted by the Septuagint – used in siege warfare by King Uzziah of Judah in the eighth century: μηχανήματα πολλὰ πρὸς πολιορκίας κατεσκεύασε πετρόβολα τε καὶ δορύβολα καὶ ἅρπαγας καὶ ὅσα τούτοις ὅμοια. The pairing πετρόβολα τε καὶ δορύβολα there looks like a variant on what might otherwise have been πετρόβολα τε καὶ ὀξυβελῆ or the like (cf. Ph.'s own τὰ μὲν λιθοβολικὰ τῶν ὀργάνων … τὰ δ' ὀξυβελῆ in *Bel.* 54.47–50), but with an (unquantified) emphasis on very long projectiles. Ph. too, in my view, probably had the same intent by using this word. Elsewhere the largest quantification he gives for a bolt-firer catapult is three-span, 0.693 m. (C26.1–3 [*93.1–3*], D31.4–5 [*99.16–17*]), but a bolt which could be called, however loosely, a 'spear' would need to be at least twice that. (For attested sizes between four and ten spans see Rihll, *Catapult* 292.) Lawrence 96 takes a different and more literal view: '[p]resumably δορύβολα were catapults with a special fitting that enabled them to project a spear'.

C59.1–3 [*95.20–22*] **Ἐὰν δὲ ἀγχιβαθεῖς τόποι τῶν τειχῶν ὦσι, προσχώματα κατασκευαστέα ἐστίν** ('If stretches of the walls are by deep water, (offshore) mounds are to be prepared'). The paradosis is προσχώματι, which can be corrected either as here or by emendation to πρόσχωμα τι κατασκευαστέον: see the apparatus in Schoene and Diels-Schramm 64. Either way, the noun πρόσχωμα itself is uncommon in this sort of sense, but LSJ s.v. 2 ('mound raised for attacking a city') cites offensive instances in the Septuagint (e.g. 2 *Ki.* 20.15), and cf. Thuc. 2.77.3 for the Peloponnesians' πρόσχωσις (*sic*: apparently a variant on the χῶμα which has been referred to since 2.75.1) at Plataiai. (At D55.2 [*100.40*] the transmitted ὑποχωρήσεις should more probably be ὑποχώσεις; see the Comm. thereto.) Defensive instances like the one here is Ph. are hard to parallel, but Garlan 391 n.59*a* cites what seems to be a relevant document from Peiraieus: published by A.N. Oikonomides, Νέον Ἀθήναιον 1 (1955) 9–14 (and registered as SEG 14.67), it summarily records a crown awarded to someone in the mid-third century who 'gave money towards the mounds of the harbours' (ἐπιδόντα | [εἰς τὰς προ]σχώσεις | [τῶν λ]ιμένων). This might relate specifically to a blocking-off of Peiraieus during the Chremonidean War (Oikonomides), or else (Garlan) have formed part of a more general programme of coastal maintenance; without more detail and a context it is impossible to tell.

Ph.'s mounds here must be of stones (Lawrence 97; W.M. Murray, *Age of Titans* 294), not the earth that would have sufficed for terrestrial equivalents; cf. in any case Arr. *Anab.* 2.21.4 on Alexander at Tyre in 332, where 'the Macedonian horse-transporting ships and triremes, which were bringing up the machines against the wall, found it hard to approach the city at this point, because numerous stones that had been thrown into the sea in front of it were impeding their close attack'. The narrative goes on, in 2.21.5–7, to recount how Alexander managed to remove these obstacles, there collectively called a χῶμα (2.21.7, which does not seem to be a reference to the Macedonian mole: so Marsden, *Development* 103; Bosworth in HCA 1.248, with misgivings). And see further under the next lemma.

The adjective ἀγχιβαθής (first in Homer: *Odyssey* 5.413) is used again, in a very similar phrase, at D29.3 [*99.8*]: ἐὰν ᾖ τόπος ἀγχιβαθής.

C59.3–6 [*95.22–25*] **ἵνα μήτε προσαγωγὴν ἔχῃ ταύτῃ μήτε τῶν μεγάλων σκαφίων ἔμβολος εἰς τὸ τεῖχος ἐμβάλῃ ἢ ἐπιβάθρας ἐπιθέντες καταλάβωνταί τινα πύργον** ('in order that there is no access at this point and that a beak of (one of) the large vessels does not penetrate into the wall and that (the enemy) do not put assault-bridges in place and capture a tower'). On 'access' see C51 under **Ἐὰν δέ**.

'Beaks' (rams) attached to some of the defenders' vessels have been mentioned as part of harbour defence in C54.7–8 [*95.4–5*] and C56.4–5 [*95.12–13*]; now it is assumed that the attackers' large(r) craft, *megala skaphia*, may also be equipped with them, but will be thwarted from using them by the offshore mounds of stones. Without such mounds, the risk that Ph. had in mind might have been rather uncommon, requiring as it does two particular conditions: a stretch of wall scarcely a metre or so inland, and adjacent water not only deep (as stated) but wide enough for these vessels to attain destructive ramming speed. In any event I am not aware of any sieges where a wall was breached by, literally, ships' *emboloi*. The general scenario Ph. has in mind is again, nevertheless, exemplified by Arrian on Alexander at Tyre (see under the preceding lemma): 'he brought against the city the machines on board his ships. First he shook down a large stretch of the wall, and when the breach seemed sufficient in width he ordered the machine-carrying ships to back water while he sent in two others, the ones that were carrying his bridges (*gephyrai*), which naturally he intended to let fall where the wall was down … And when Alexander's ships closed upon the city and the bridges were let down on the wall from them, the hypaspists went down them gallantly and ascended the wall' (*Anab.* 2.23.1–4). Arrian's *gephyrai* here are *epibathrai*, Ph.'s word, in the version of these

events in Diod.Sic. 17.43.7 and 17.46.2. (On *epibathrai* and, in one instance, *diabathrai* in Ph. see C14 under **Πρὸς δέ**.)

C60.2–4 [*95.26–28*] **τὰς ἀγκύρας τῶν ἐφορμουσῶν νηῶν κελεύειν τοὺς κολυμβῶντας ὑποτέμνειν καὶ τὰ ἐδάφη αὐτῶν ἐκτρυπᾶν** ('to order the divers to undercut the anchors of the blockading ships and to drill out their bottoms'). The prefix in ὑποτέμνειν can sometimes imply a covert or underhand procedure, as well as what it says about positioning: see LSJ s. v. (On the cognate noun see D42 under **ἔστι δὲ ταῦτα**.)

That the attackers will indeed seek to blockade the city's harbours is taken for granted, from their perspective, in D5.4–5 [*96.40–41*]. Again the Tyre narrative supplies an illustrative episode (Arr. *Anab.* 2.21.6); and the Macedonians' counter-measure there, substituting chains for ropes, is precisely the one advocated by Ph. in D53 [*100.33–36*] for deep-water conditions. See also e. g. Paus. 10.19.1–2 on the exploits of Scyllis (or Scyllias: Hdt. 8.8.1) of Skione and his daughter Hydna against Xerxes' fleet in 480, and D. C. 74.12.2 on the defence of Byzantium against Septimius Severus in 194 CE; F. J. Frost, 'Scyllias: diving in antiquity', *G&R* 15 (1968) 180–185.

D54 [*100.36–39*] addresses from the attackers' side the second hazard mentioned here, τὰς ἐκτρυπήσεις τῶν νεῶν. (Hesychius ε 1767 and other lexicographers regard the verb's ἐκ- prefix as conveying secrecy.)

C61.1–2 [*95.28–29*] **μάλιστα δὲ οὕτω κωλύσομεν τοὺς ἐναντίους ἐφορμίζειν** ('this will be a particularly good way for us to prevent our opponents from bringing their ships to anchor'). For such a tailpiece cf. generally C48 [*94.29–31*], μάλιστα γὰρ οὕτως κτλ.

The transmitted infinitive here is ἐφαρμόζειν. Schoene retained it, while in his apparatus noting Emmanuel Miller's suggested emendation [see A15 under **ἀπὸ τῶν**] to ἐφορμίζειν and tentatively proffering two variants of his own ('an ἐφορμεῖν vel ἐφορμίζεσθαι?'). Diels-Schramm 64 and Garlan 314 follow Miller. W. M. Murray, *Age of Titans* 295 with n.33 translates the whole phrase as '[t]his is the best way to thwart your enemies who anchor opposite your harbor', with a note as follows: 'Philo relies on the close relationship between two slightly different verbs: ἐφορμέω (to anchor against a place, or blockade) and ἐφορμίζω (to reach port or come to anchor). Their meanings, as determined by the context of C60–61 [*95.25–29*], seem almost to overlap here'.

C62.1–4 [*95.29–32*] **Τὰ δ' ἄλλα πάντα χρήσιμα ἐν ταῖς τοιαύταις προσβολαῖς ὅσα καὶ πρὸς τὰς ἐκ τῆς ἠπείρου γινομένας προσαγωγάς** ('All other (tactics) useful in such (seaborne) attacks are the ones also (effective) against approaches made from the mainland'). See C51 under **Ἐὰν δέ**.

C63 [95.32–36]: precautions against cross-fire

C63.1–3 [*95.32–34*] **Ἐὰν δὲ μακρᾶς οὔσης τῆς πόλεως ἀμφίβολον ᾖ τι τοῦ τείχους, διοικοδομητέον ἐστι τοίχῳ ἢ δέρρει ἢ αὐλαίαις διαφρακτέον** ('If, in a

city which is elongated, any part of the wall can be attacked from both sides, it is to be built-across by a (partition-)wall or fenced-across by a screen or by drapes'). This eventuality should ideally have been avoided by careful building in the first place: see A85 [*86.11–13*], using the same vocabulary (ἵνα κατὰ μηθὲν τὸ τεῖχος ἀμφίβολον οἰκοδομῆσαι).

The manuscripts have simple οἰκοδομητέον, but Schoene's διοικοδομητέον (mirroring the later διαφρακτέον) has become standard. The verb covers barricading and partitioning of various kinds: see LSJ s. v., and cf. Garlan 391 n.63*a*, who rightly comments that the instance here in Ph. does not entail a structural foreshortening of the line of defence but is a simple protective barrier (behind the defenders) which, as we see, does not have to be a wall as such. On screens see C5 under **δέρρεις**. The idea that soft as well as hard barriers can be effective in such circumstances is a long-standing (and long-lasting) one: cf. Aen.Tact. 32.1 & 9–10, and in a later age Veget. 4.6.

The second verbal adjective here, διαφρακτέον, is a *hapax legomenon*.

C64 [95.36–39]: another tactic against 'machines'

C64.1–2 [*95.36–37*] **Ἐπειδὰν δὲ τῷ προσαγομένῳ μηχανήματι ὁδοποιηθῇ** ('When a path has been made (by the enemy) for a machine being deployed'). For the verb ὁδοποιεῖν see also D17.2–4 [*98.5–7*] with the Comm. thereto.

'L'ouvrage de charpente par excellence, pour Philon, est l'hélépole, comme le montre la suite du texte' (Garlan 392 n.64*a*). See below under **ἵνα μή**.

C64.2–3 [*95.37–38*] **πέτρους ὡς μεγίστους προσρίπτειν ἐκ τῶν πετροβόλων, μὴ στρογγύλους** ('to propel rocks as large as possible – but not spherical – out of the rock-projectors'). Schoene printed here Buecheler's 'correction' of the transmitted προσρίπτειν to the very much rarer (though not, as Arnim, *Index* 69, a *hapax legomenon*) προρρίπτειν; and Diels-Schramm 64 follow suit. I agree with Garlan 314 in finding the paradosis acceptable, even though προσρίπτειν is much more often used figuratively than literally. (A well-known example is Polybius's censure of Demosthenes, on "traitors", in 18.41.1: πικρότατον ὄνειδος τοῖς ἐπιφανεστάτοις τῶν Ἑλλήνων εἰκῇ καὶ ἀκρίτως προσέρριψε. For a literal instance see Plut. *Mor.* 293D on the abuse suffered by Charilla, τῷ προσώπῳ τὸ ὑπόδημα προσέρριψεν.)

In being less aerodynamic than spherical ones, such rocks would not be the normal type of ammunition used for maximum impact on their targets, but they were better (because harder to roll quickly away) for the purpose envisaged here; cf. Marsden, *Development* 80 n.3; Rihll, *Catapult* 272. See also Garlan 392 n.64*b*.

Xen. *Hell.* 2.4.27 describes stones larger than any that could be fired from petroboloi serving much the same purpose in the civil war at Athens in 403: 'if this too is something one should mention, when the town engineer [see B49 under **μηχανοποιόν**] realized they were about to bring forward their machines by the racetrack leading out of Lykeion, he ordered all the ox-teams to bring wagon-filling stones and to deposit them wherever each man wished in the racetrack. When

this was done, every one of the stones caused a lot of trouble'. (For the wagon-filling stone size see also Aen.Tact. 32.5, though they are put to a different use there.)

C64.3–4 [*95.38–39*] **ἵνα μὴ δύνωνται τὴν ἑλέπολιν προσάγειν** ('in order that they are not able to advance the helepolis'). On this term see generally (e.g.) Marsden, *Treatises* 84–85; Garlan 209, 228–234; Lendle, *Texte* 36–68, esp. 36–37; Whitehead and Blyth, *Athenaeus* 134–138 (and General Index s.v.). Any consistent and authentic differentiation between helepoleis and (mere) *Wandeltürme* is uncertain; in all probability Marsden and others are right to think that 'city-destroyer' – properly an adjective, and perhaps suggested by the application of the adjective ἑλέπτολις to Helen and, later, to Iphigeneia, in Attic tragedy – was a nickname for particularly large and complex towers coined in and perpetuated after the late fourth century. The most celebrated specimen of the genre is the one deployed by Demetrius Poliorcetes in the second (304) stage of his siege of Rhodes: Diod.Sic. 20.91; Plut. *Demetr*. 21.1–2 (Athen.Mech. 27.2–6 and Vitruv. 10.16.4 name its builder as an Athenian called Epimachus); and indeed, despite Biton's application of the noun to the self-propelled tower which the Macedonian engineer Posidonius made for Alexander the Great (Biton 51.6–56.8 [4.1–61]; Marsden, *Treatises* 70–73 with 84–90; Lendle, *Texte* 38–58), it is indeed Demetrius's activities between 307/6 and the 290s with which the term seems to be especially associated.

As used here in Ph., for the only time, it is in context simply a variant of the one with which the sentence has opened, μηχάνημα, and it illustrates the fact that '[a]fter Demetrius, *helepolis* continued for centuries as a technical designation for large mobile siege-towers designed to carry other, smaller engines [such as artillery and assault-bridges] and to put them on at least equal terms for height with the defenders on their walls and towers': Marsden, *Treatises* 85, citing the present passage alonsgside a selection of considerably later ones (Onas. 42.3, generic; Joseph. *BJ* 2.553, 3.121; Ammian. Marc. 23.4.10). See also e.g. Diod. Sic. 34/35.34 on Antiochus IX Cyzicenus (a.k.a. Philopator), whose eccentric shortcomings in the late second century included 'possessing no helepoleis or other siege engines that would have brought him great renown and noteworthy advantages'.

C65–66 [95.39–49]: more tactics against escalades etc.

C65.1–5 [*95.39–43*] **Χρήσιμα δ' ἐστὶ καὶ τὰ προκαταρτιζόμενα παχέα ἀμφίβληστρα ἐκ τοῦ λίνου πρὸς τοὺς κατὰ τὰς κλίμακας <καὶ> διὰ τῶν διαβαθρῶν ἐπὶ τὰ τείχη ἀναβαίνοντας** ('Also, thick wrappings pre-prepared out of linen are efficacious against men climbing up on the walls by means of ladders <and> across assault-bridges'). For echos of this (and the clause which follows: see the next lemma) in *Par.Pol*. 261.3–10, see **Appendix 3** passage no.8. D41 [*99.48–51*] will advise the attackers how to counter such 'wrappings' (ἀμφίβληστρα again).

This is Ph.'s only mention of *linon* (a term which can apply both to the flax plant and, as here, to the textile made from it: see LSJ s.v.; Thompson, *Memphis* 46–51, at 47).

Garlan 396 n.65*a* and Bettalli, *Enea* 333 both connect this passage with Aen. Tact. 39.6–7: 'a method employed before now against those who are over-confident and come closer to the wall than is prudent, at night or in daytime, calls for the prepraration of *brochoi* – hidden by day but unconcealed at night; with these one draws the enemy forward by skirmishes and hauls up anyone who has been trapped. (7) The *brochos* should be of the strongest rope to be had, and the line that lifts it should be chain for the first two cubits [0.924 m.], to prevent its being cut; but the rest, from the point where they are pulling, can be of rush-rope'. Garlan does not explain where he thinks the nub of the comparison lies, beyond translating Ph.'s ἀμφίβληστρα (in both passages) as 'filets', nets. I have preferred a more neutral rendering; but even if Ph. did have nets in mind, I am not convinced that Aeneas, as Bettalli loc.cit. asserts, did. It is true that Diod.Sic. 17.43.10, on a ploy used by the Tyrians against Alexander's men, speaks unambiguously of 'fishing nets' (ἁλιευτικὰ δίκτυα τοῖς ἐπὶ τῶν ἐπιβαθρῶν διαμαχομένοις ἐπιρριπτοῦντες), but in my opinion the *brochoi* in Aeneas are what they generally are elsewhere, nooses (see A51 under **βρόχους**), and any link between Aeneas and Ph. on this tactic is, consequently, faint.

C65.5–6 [*95.43–44*] **ὅταν γὰρ ἐπιρριφῇ αὐτοῖς, ῥᾳδίως συνθέοντος ὑποχείριοι γίνονται** ('for when (the wrappings) are thrown onto them, they bunch and (the men) are easily under control'). Ph.'s only use of ἐπιρρίπτειν; elsewhere he prefers the synonymous ἐπιρριπτεῖν (D41.1 [*99.48*], D46.2–3 [*100.13–14*], D73.7 [*102.18*], D75.2–3 [*102.24–25*]).

Though most of this is unproblematic as transmitted (and ὑποχείριοι is echoed in the *Par.Pol*.: see under the preceding lemma), attempts have been made in the past to emend συνθέοντος: to συνδέοντος (Peter Wesseling in his 1746 edition of Diodorus)*, or, recasting the syntax, to συνδεθέντες or συρέντες (Brinkmann ap. Schoene). Editors retain the somewhat awkward paradosis.

C66.1–2 [*95.44–45*] **Καὶ τὰ ἀγκιστρωτὰ ἐμβόλια** ('Also (useful are) barbed harpoons'). Of itself, the neuter noun *embolia* is generic enough to apply to any kind of thrown missile (*Bel*. 74.19 & 22 illustrate another sense: an 'insert' in a catapult), but the adjective which accompanies it does make 'harpoons' an appropriate translation (also in Lawrence 99 and W.M. Murray, *Age of Titans* 295; cf. 'Wurfhaken', Arnim, *Index* 27 and Diels-Schramm 64; 'des piques en forme de hameçons', Garlan 314). For a 'barbed' (ἀγκιστρωτός) weapon cf. Plb. 6.23.10 (προσήρμοσται δ' ἑκάστοις βέλος σιδηροῦν ἀγκιστρωτόν, describing the Roman light *pilum*), but 'barbs/hooks' themselves will feature on the attacking side in D73.6–7 [*102.17–18*] and D75.1–2 [*102.23–24*].

A tactic of this general kind is exemplified by the defenders of Tyre against Alexander, who according to Diodorus 'forged enormous tridents equipped with

* Schoene, Diels-Schramm 64 and Garlan 314 all give this Wesseling reference as being 'ad Diod. XVIII 43'. In fact it arises (in Wesseling's vol. VII 615), summarily, from the phrase ἁλιευτικὰ δίκτυα in Diod.Sic. 17.43.10 (Tyre); see above under **Χρήσιμα**.

barbs, and would strike with these at close range the men standing on the (siege-) towers. The tridents stuck into these men's shields and, as ropes were attached to them, the defenders would haul on the ropes and drag them toward themselves' (χαλκευσάμενοι γὰρ εὐμεγέθεις τριόδοντας παρηγκιστρωμένους τούτοις ἔτυπτον ἐκ χειρὸς τοὺς ἐπὶ τῶν πύργων καθεστῶτας. ἐμπηγνυμένων δὲ εἰς τὰς ἀσπίδας τούτων καὶ κάλους ἐχόντων προσδεδεμένους εἵλκον πρὸς ἑαυτοὺς ἐπιλαμβανόμενοι τῶν κάλων: Diod.Sic. 17.43.8; his verb there, παραγκιστροῦσθαι, is otherwise attested only in a passing mention of τὰ παρηγκιστρωμένα βέλη by Plut. *Mor.* 631E). On this episode see Garlan 239–241, at 240, comparing the variant terminology in Curtius Rufus 4.2.12 (*harpagones*) and 4.3.24–26.

See further under the next lemma.

C66.2–6 [*95.45–49*] **ἀπὸ γὰρ τῶν καλῳδίων εὖ ἐξακοντιζόμενα καὶ ἄνωθεν ἐμβαλλόμενα, ὅταν ἐμπαγῇ εἰς τὰ μαλάγματα καὶ τὰς ῥυτὰς σανίδας <καὶ ἀνασ>πάσῃ τὰ καλῴδια, πολλὰ ἀποσπᾶν αὐτῶν δύναται** ('for if well thrown out from their cords and (therefore) striking from above, when they sink into the paddings and the (?)dragged planks <and (someone)> pulls up the cords, it is possible to tear many of them away'). The text here is the one printed by Diels-Schramm 65 and Garlan 314: it incorporates εὖ for the transmitted οὖ (Brinkmann ap. Schoene) and Schramm's <καὶ ἀνασ>πάσῃ for the transmitted adjective μασητά ('to be chewed', clearly wrong here; Schoene's apparatus lists other suggested ways of emending it.)

As these harpoons (see under the preceding lemma) are akin to javelins or spears, propelling one by means of a cord or strap is much as we would have expected (cf. e.g. Strab. 4.4.3 on the Gallic method, ἐκ χειρὸς οὐκ ἐξ ἀγκύλης ἀφιέμενον); nevertheless in this instance the cords (καλῳδία: see A37 under **ὑπὸ τῶν**), given the additional purpose they serve, must be visualized as longer than usual. The phrase ἄνωθεν ἐμβαλλόμενα does, in any event, mean 'striking from above', not 'retirés vers le haut' (Garlan 314).

As to what they will strike, W.M. Murray, *Age of Titans* 295 n.34 declares that 'the general meaning is clear'. I disagree. The 'paddings' – μαλάγματα, quite a characteristic word in Ph.: cf. C3.4–5 [*91.6–7*], C5.2–3 [*91.12–13*], D17.6. [*98.9*] and D51.7 [*100.31*] – might refer back to the 'thick wrappings' of C65.1–5 [*95.39–43*] (nets? See the Comm. there), but there is an alternative, which in large measure hinges on the sense of the immediately following phrase, τὰς ῥυτὰς σανίδας. Lawrence 99 (followed by W.M. Murray, *Age of Titans* 295) understands this to refer to the planking of the assault-bridges. Given that ῥυτάς here is certainly odd and quite possibly corrupt ('zweifelhaft': Diels-Schramm 65), these planks might be the defenders' own palm-wood ones of C3.1–5 [*91.3–7*], which have 'paddings' in front of them, as a defence against petroboloi. This seems to be the view taken by Garlan 314, by translating τὰς ῥυτὰς σανίδας as 'les panneaux de protection'. It does strike me as not without difficulties, overall, because the defenders seem to be removing what they themselves have put in place, but the neuter πολλὰ…αὐτῶν could strictly refer only to the outer μαλάγματα, not the planking itself, and it would perhaps have been thought worth hauling up the 'paddings', temporarily, if attackers were enmeshed in them.

C67–71 [95.49–96.15]: best use of one's own rock-projectors

C67.1–4 [*95.49–96.1*] **Πάντων δὲ μάλιστα δεῖ σπουδάζειν περὶ τοὺς τριακονταμναίους πετροβόλους καὶ τοὺς χρωμένους τοῖς ὀργάνοις τούτοις** ('But it is necessary above all to devote special care to thirty-mina (13.1 kg.) rock-projectors and to the men operating these engines'). For σπουδάζειν see A28 under **σπουδαστέον**; for catapult operatives, B49 under **μηχανοποιόν**.

On petroboloi of this calibre see C57 under **ἐν ᾧ**. Ph.'s fuller treatment of them here, in C67–71 [*95.49–96.14*] as a whole, seems to present them as 'his preferred all-purpose general catapult' (Rihll, *Catapult* 162). Marsden, *Development* 145 noted the comparative rarity of towers, even in the Hellenistic period, big enough to house ones of this size. That at first sight could lead us to suspect that Ph.'s advice is expressing more an ideal than a reality, and so to some extent it might be; however, the 'emplacements' (see the next lemma) might typically have been at ground-level; see generally Rihll, *Catapult* 137–139, and A32 under **κάτωθεν**.

C67.4–5 [*96.1–2*] **καὶ τὰς βελοστάσεις αὐτῶν, ἵνα ὦσιν ὡς βέλτιστα πεποιημέναι** ('and to their emplacements, in order that they are made as good as possible'). On artillery emplacements see generally A21 under **ἐν οἷς**. In the present passage the feminine participle πεποιημέναι guarantees that the ἵνα-clause applies only to them, not to the petroboloi themselves. Even so, what immediately follows, C68.1–4 [*96.2–5*], does describe the lithoboloi (*sic*) too as needing to be 'well made thus' (οὕτως εὖ πεποιημένων), before saying that the emplacements must be appropriately situated (and the operatives suitably expert: see the next lemma).

C68.4–5 [*96.5–6*] **καὶ τῶν χρησομένων αὐτοῖς ἐντέχνων ὄντων** ('and the men who will use them are skilled'). LSJ s.v. ἔντεχνος II cites only Plato (*Plt.* 300E, *Lg.* 10.903C) for this personal application of the adjective, but the present passage also illustrates it.

C68.5–7 [*96.6–8*] **οὔτ' ἂν [γερροχελώνη] μηχάνημα οὔτ' αὖ στοὰ οὔτε χελώνη ῥᾳδίως προσαχθείη** ('no [wicker-tortoise] machine or stoa or tortoise could easily be deployed'). On stoas in Ph. see A50 under **τὰς προσῳκοδομημένας**. In the present passage the nature of such a stoa is clarified, at least notionally, by its differentiation from a μηχάνημα and a χελώνη, but textual uncertainty clouds the issue more generally. Graux's deletion of [γερροχελώνη] as an intrusive gloss is standard, and reasonably so. Perhaps, even as such, it is misplaced and should in fact follow στοά. Be that as it may, the verb attaching to all three nouns is προσάγειν, and by translating it as 'deployed' rather than something more concrete ('l'on puisse…approcher', Garlan 315; 'brought forward', Lawrence 99 and W.M. Murray, *Age of Titans* 295) I intend to leave open the possibility that this is a built, stationary *stoa* functioning in support of other equipment which, like the two things specified, moves forward.

C69.2 [*96.9*] **οὐκ ἂν ὑποκινήσειεν οὐθέν** ('would…not move on at all'). For intransitive ὑποκινεῖν in this sort of sense (LSJ s.v., II.1) cf. e.g. Hdt. 5.106.5 (figurative), Aristoph. *Ran.* 644, Xen. *Cyn.* 3.6.

C70.1–3 [*96.10–12*] **Συμμεμέτρηται δὲ ταῦτα καὶ σφοδρότατα ταῦτ' ἐστὶ πρὸς τὰς πληγὰς τὰ βέλη** ('This artillery is commensurate with (such targets) and very powerful as regards its blows'). Ph. had used this verb twice in *Bel.* 63.1–7, but in a simpler sense (when giving dimensions, of height and width, which include a stated component). Closer to the meaning conveyed in the present passage is the phrase συμμετρία τοῦ ὀργάνου in *Bel.* 53.7–8. See also e.g. [Aristot.] *Mech.* 853b39–40 (συμμετρεῖσθαι πόσον βάρος ἕλκει τὸ ἐν τῇ πλάστιγγι κείμενον).

C71.1–3 [*96.12–14*] **ὥστε τούτων ἐνεργούντων μηθὲν ἂν δεινὸν κατὰ τὰς γινομένας προσβολὰς τὴν πόλιν παθεῖν** ('consequently, with this in action, the city would suffer nothing terrible in the assaults that occur'). The idiom τούτων ἐνεργούντων recurs, but personalized, in D66.4–5 [*100.34–35*], ἔστωσαν ἐνεργοῦντες. For artillery 'in action' cf. Ἐνεργῆ δὲ σοι τὰ βέλη πάντα ἔστω in D25.1 [*98.42*].

With the phrase as a whole cf. τούτων γὰρ ἁρμοζομένων οὐθὲν ἂν πάθοι δεινὸν ἡ πόλις in A83.4–5 [*86.1–2*] and, more generally, Τοῦτον ἄν τις τὸν τρόπον πολιορκῶν τὰς πόλεις ἂν λαμβάνοι μάλιστα μηθὲν αὐτὸς ἀνήκεστον παθών in D111.1–3 [*104.40–42*]. (For the basic idiom see also A22.4–5 [*81.28–29*], A49.3–4 [*83.29–30*], A76.5–7 [*85.26–28*], B33 [*88.38–40*].)

C72–73 [96.15–26]: care of the wounded

C72.1 [*96.15*] **Δεῖ δὲ καὶ ἰατροὺς χαριεστάτους ἔνδον εἶναι** ('It is also necessary that there be, inside, very accomplished doctors'). For the adjective χαρίεις used of personal qualities see generally LSJ s.v., II.1: 'elegant, accomplished'. Classical-period usage seems to focus most closely on the elegance/grace/taste aspects, as befits its cognate noun χάρις, but note e.g. Aristot. *EN* 1.1102a21–23: 'those doctors who are accomplished take a lot of trouble about their knowledge of the (*sc.* whole) body' (τῶν δ' ἰατρῶν οἱ χαρίεντες πολλὰ πραγματεύονται περὶ τὴν τοῦ σώματος γνῶσιν). With Ph.'s superlative cf. Diod.Sic. 12.33.3, of Corinthian generals in 433.

The matter-of-fact phraseology here evades the issue of how exactly cities are to ensure the presence of such doctors. Chaniotis, *War* 96–97, who brings together a convenient dossier of primary evidence on the topic, finds that many cities did routinely 'employ public doctors', and that a salary or retainer is the model that should probably be envisaged as the norm; a second-century instance is Asclepiades of Perge, paid a thousand drachmas per annum for serving as that capacity in (Pamphylian?) Seleukeia (I.Perge 12; Samama 439–442 no.341). Asclepiades' stipend was modest, but the fact that it is on record at all exemplifies the other, non-monetary way in which successful *iatroi dêmosieuontes* (whether citizens of the polis in which they officiated or resident foreigners) could expect to be recognized and rewarded: via laudatory language in honorific decrees. Some other relevant instances: Hermias of Kos, who served for five years in Gortyn during the second half of the 220s, during which he ministered to Lyttian-War victims from both Gortyn itself (I.Cret IV 168, Samama 231–233 no.126) and Knossos (Syll.[3] 528,

I.Cret. I viii 7, Samama 233–234 no.127; Austin[2] no.144); Diodorus of Samos, thanked by his own city in c.200 (IG xii.6 1/12; Samama 289–291 no.168, Austin[2] no.145); Anaxippus, thanked and rewarded by the Koan deme of the Aigelioi, at some time in the third or second century, for 'many years' of service as a doctor 'appointed by the assembly' (SEG 27.513; Burstein no.27; Samama 238–239 no.130); Apollonius of Miletos, twice honoured in Tenos during the second half of the second century for, *inter alia*, not abandoning it in wartime (IG xii.5 824 [cf. SEG 36.765], Syll.[3] 620, Samama 284–288 no.166).

A case like that of Apollonius lends especial weight to the observation of Garlan 392 n.72*a* that 'le recrutement des médecins posait en temps de guerre un problème particulièrement grave et difficile à résoudre' – or in other words, that conditions on the ground might struggle to fulfil Ph.'s ideal.

General studies of these and related matters: L. Cohn-Haft, *The Public Physicians of Ancient Greece* (Northampton MA 1956), esp. 46–55; P. Roesch, 'Médecins publics dans les cités grecques', *Historie des sciences médicales* 18 (1984) 279–293; N. Massar, 'Un savoir-faire à l'honneur. "Médecins" et "discours civique" en Grèce hellénistique', *Revue belge de philologie et de l'histoire* 9 (2001) 175–201; Samama passim, esp. 38–45, 50–51 (on the *iatrikon* tax, attested at third-century Delphi [Syll.[3] 437.4–5] and elsewhere, presumed to be a levy for maintaining a public doctor); and summarily V. Nutton, *Ancient Medicine* (Abingdon & New York 2005) 152–155.

See further under the next three lemmata.

C72.2 [*96.16*] **ἐμπείρους τραυμάτων καὶ βελῶν ἐξαιρέσεως** ('with experience of wounds and of the extraction of projectiles'). Though Schoene printed the paradosis ἐξαιρέτως, he reported the tentative emendation to ἐξαιρέσεως (Haase, Miller) which has been adopted by his successors. (The phrase βελῶν ἐξαιρέσεις occurs in Gal. *de anat.admin.* 2.283.)

Ph.'s 'very accomplished' doctors (see under the preceding lemma) must be possessed, more specifically, of practical experience. Plat. *Lg.* 9.857C and other evidence cited in LSJ s.v. ἐμπειρία, II.1, testifies to a disparaging sense of medical *empeiria* as 'practice without knowledge of principles', but clearly that is of no relevance here. On the contrary, it is well recognized that this attribute features prominently in the vocabulary of honorific decrees for doctors: so, principally, J. and L. Robert, *BE* 1966 no.274 ('la qualité des médecins'); cf. L. Robert, 'Inscriptions de Didymes et de Milet, 1re partie', *Hellenica XI–XII* (Paris 1960) 440–489, at 463 with n.5; Garlan 392 no.72*b*; and for a good recent instance, from the first half of the second century, SEG 54.749 (Halasarna honours the doctor Antipater τᾶς τε κατὰ τὰν [τέχ]ναν ἐμπ<ε>ιρίας καὶ | τᾶς κατὰ τὸν βίον ἀναστροφᾶς: lines 5–6).

Ph. wants the experience of these doctors to have been acquired in dealing with wounds (on which see generally O. Jacob, 'Les cités grecques et les blessés du guerre', in *Mélanges Gustav Glotz* II (Paris 1932) 461–481; C.F. Salazar, *The Treatment of War Wounds in Graeco-Roman Antiquity* (Leiden 2000)), including those caused by arrows and other sharp projectiles which are still *in situ* and must be extracted: see above. (Rihll, *Catapult* 315 n.44 summarizes some anecdotes

from Procopius, *de bellis* 6.2.14–31 and 6.5.24–27: sometimes the offending *belos* is removed, sometimes not. See also Chaniotis, *War* 1, on some of the war-wounded who sought healing miracles at Epidauros [L. R. LiDonnici, *The Epidaurian Miracle Inscriptions* (Atlanta 1995); Austin[2] no.146]; they include a man 'who bore a spear-head in his jaw for six years'.) The relevant expertise, inevitably, may well have been gained by a process of trial-and-error, with war (to put the matter bluntly) an excellent career-opportunity. C. F. Salazar, 'Treating the sick and wounded', in Campbell and Tritle, *Oxford Handbook of Warfare* 294–311, at 305–306, invokes the Hippocratic περὶ ἰητροῦ (*de medico*) 14.6–8 on this point: 'he who intends to do surgery must go on campaign and follow mercenary armies; that is how he could become trained for this necessity' (Τὸν μὲν οὖν μέλλοντα χειρουργεῖν στρατεύεσθαι δεῖ καὶ παρηκολουθηκέναι στρατεύμασι ξενικοῖς· οὕτω γὰρ ἂν εἴη γεγυμνασμένος πρὸς ταύτην τὴν χρείαν).

C72.3–4 [*96.17–18*] **ἔχοντας φάρμακα καὶ ὄργανα τὰ προσήκοντα** ('They must have (their own) drugs and the appropriate instruments'). By contrast with the items Ph. wants the city itself to provide (see the next lemma), these are indeed, apparently, things that the doctors must furnish for themselves, *qua* competent professionals. For medical φάρμακα and ὄργανα cf. Xen. *Cyrop.* 5.3.47, Plat. *Plt.* 298C; and for ὄργανα see also Hipp. κατ' ἰητρεῖον (*de officina medici*) 2.2.

C72.4–5 [*96.18–19*] **τὴν πόλιν χορηγεῖν κηρωτὴν καὶ μέλι καὶ ἐπιδέσμους καὶ σπληνία** ('the city must pay for wax and honey and bandages and compresses'). On the verb χορηγεῖν in this sort of sense (unconnected with festival choruses and the defraying of their expenses by rich individuals) see generally LSJ s. v., II.3, and cf. e. g. Plb. 3.68.8 (of the Celts of NE Italy subsidizing Hannibal), τὸ δὲ τῶν Κελτῶν πλῆθος … δαψιλῶς μὲν ἐχορήγει τὸ στρατόπεδον τοῖς ἐπιτηδείοις. This usage of χορηγεῖν in inscriptions of the era was expressed thus, with his trademark forcefulness, by L. Robert, 'Décret d'Andros', in *Hellenica XI–XII* (Paris 1960) 116–125, at 123 n.2: 'Le mot a ici [*sc.* in this stone from Andros: IG XII suppl. 250] le sens très général qui est fréquent à l'époque hellénistique et qui est souvent méconnu: les fournitures, tout ce qui ressort de la générosité – blé, vin, huile, argent, travaux, etc.'.

As to the four commodities that Ph. wants the city itself to provide, von Staden 'Andréas' 167–169 (Table II) documents their occurrence in both the Hippocratic corpus (selectively) and in Hellenistic medical writers such as Herophilus of Chalkedon (c.330–260):

(i) Wax (or 'cerate', as preferred by C. F. Salazar, 'Treating the sick and wounded', in Campbell and Tritle, *Oxford Handbook of Warfare* 306) – one of the items prepared to treat General Lamachus, who has comically injured his ankle and head, in Aristoph. *Ach.* 1176–1177 – is mentioned not only twice in Hipp. περὶ ἀγμῶν (*de fracturis*) 4, as cited by von Staden, but again later in that treatise and in nine other works in the corpus; and cf. Herophilus fr.257 von Staden (κηρός). It also receives copious mention in e. g. Dioscorides (and the *Geoponica*). Though it had numerous medical and quasi-medical uses, including fumigation (Plin. *HN* 22.117; Garlan 392 n.72*d*, citing Berendes [see B32 under **διελεῖν**] 193), its appearance here is likely, in my opinion, to reflect above all its use as a salve. 'Wax', in any event, is to be understood as beeswax, and as such linked with the next item in terms of availability. (For wax and honey in the same context see also e. g. P.Cair. Zen. 59823 = Bagnall/Derow[2] no.100: the writer of this letter in 253 wants both.)

(ii) Honey (for which see already B32 under **ὡς βελτίστῳ**), likewise, features prominently throughout the Hippocratic corpus (and elsewhere), and cf. Herophilus fr.260 von Staden. Again Pliny observes that its applications are manifold (*HN* 22.107), as doubtless Ph. himself was aware; nevertheless, again, its inclusion in his list of medical necessities here is best explained by its antibacterial properties (as nowadays they would be termed) in the dressing of wounds.

(iii) 'Bandages', in Greek, are either *epidesmoi*, as here (and cf. e. g. Aristoph. *Vesp.* 1440), or cognate nouns such as *epidesma*, *epidesmis*, and (as e. g. in Mantias [OCD 894] 14, cited by von Staden) *epidesis*. They were typically made of linen, which C65.3 [*95.41*] has mentioned in another context; see also under the next item.

(iv) The term σπληνίον is defined by LSJ s. v., I, as a 'pad or compress of linen laid on a wound'. It appears in many medical writers, including, as cited by von Staden, Mantias again (10); see also the simile in a verse fragment attributed by Stobaeus (*Anth.* 2.4.3) and others to Philemon (frs. 112–113 Kock, but not in K.-A.), where it stops a wound being inflamed (ὡς σπληνίον πρὸς ἕλκος οἰκείως τεθὲν | τὴν φλεγμονὴν ἔπαυσεν). As such, its close similarity to a 'bandage' is clear (and note the contiguous 'ἐπίδεσμα, σπληνίον' in Pollux 10.149), but Garlan 393 n.72*f.* surely hits on the cardinal point of difference when (following Berendes [see B32 under **διελεῖν**] 240) he calls a σπληνίον a dressing 'revêtu d'un onguent'; a bandage would be dry.

C72.5–10 [*96.19–24*] **ἵνα μὴ παραπολλύωνται οἱ στρατιῶται τραυματίαι γενόμενοι, ἀλλὰ ταχὺ ὑγιαζόμενοι χρήσιμοι γίνωνται ἐν ταῖς ὕστερον γινομέναις συμβολαῖς προθύμως κινδυνεύοντες διὰ τὰς γενομένας θεραπείας αὐτοῖς καὶ χορηγίας** ('in order that the troops do not die when they are wounded, but regain their health quickly and become useful in subsequent engagements, fighting eagerly because of the care services and supplies provided'). The manuscripts transmit the first verb here as παρολλύονται. As it needs to be subjunctive, Schoene printed παρολλύωνται; but the standard emendation to παραπολλύωνται (Brinkmann ap. Schoene) goes beyond that, to make Ph. use the same compound as he does in D70.4 [*101.45*], παραπόλωνται.

This long explanation, though repetitiously phrased (with four resorts to γίνεσθαι) and rather naive-sounding overall, does further underline Ph.'s concern, already at C45–48 [*94.20–31*], for the morale of the mercenary troops. In the final clause, θεραπείας echoes θεραπεύειν twice in C45 [*94.20–24*], and χορηγίας picks up χορηγεῖν earlier in the present sentence (see under the preceding lemma).

C73.1–3 [*96.24–26*] **πολλάκις δὲ καὶ ταῦτα τῆς πόλεως ἐπὶ σωτηρίᾳ γίνεται** ('often, too, it is these things which are favourable to the preservation of the city'). For this sense of γί(γ)νεσθαι, which seems to be required here, see generally LSJ s. v., I.3, citing Thuc. 5.55.3 and Xen. *Hell.* 3.1.17. The phrase ἐπὶ σωτηρίᾳ seems to be Thucydidean in origin (five instances), but for ἐπὶ σωτηρίᾳ τῆς πόλεως spe-

cifically cf. Joseph. *AJ* 14.402, *BJ* 1.295; Plut. *Num.* 13.2, *Sol.* 14.2; Polyaen. 6.12; SEG 56.1799.

The noun σωτηρία itself has more facets than can readily be captured in a one-word translation; I have opted for 'preservation', but there are also overtones of salvation and also (in a figurative way) health; cf. Garlan 315 and 393 n.73*a*, 'salut'. As with *empeiria* (above under **τὴν πόλιν**), the concept features particularly in documents concerning doctors: see e.g. L. Robert, 'Décret de Delphes pour un médecin de Coronée', *BCH* 78 (1954) 68–72, at 72 (= *Opera Minora Selecta* I (Amsterdam 1969) 255–259, at 259; N. van Brock, *Recherches sur le vocabulaire médical du grec ancien: soins et guérison* (Paris 1961) 230–234. More generally, F. Gschnitzer, 'Zur Normenhierarchie im öffentlichen Recht der Griechen', in P. Dimakis (ed.), *Symposion 1979* (Athens 1981) 143–164 (reprinted in his *Kleine Schriften zum griechischen und römischen Altertum* (Stuttgart 2003) 153–174) assembles a dossier of 37 Hellenistic and Roman-period decrees which contain the phrases εἰς σωτηρίαν τῆς πόλεως (and/or εἰς φυλακὴν τῆς χώρας) variants thereon. See also e.g. P.J. Rhodes, *The Athenian Boule* (Oxford 1972) 231–235 (summarized in P.J. Rhodes with D.M. Lewis, *The Decrees of the Greek States* (Oxford 1997) 31); E. Kearns, 'Saving the city', in Murray and Price (eds.), *The Greek City* 323–344.

PART D: ATTACKING MEASURES

Thwarted in his attempt (to capture Meliteia), Philip made camp near the river Enipeus and collected from Larisa and the other cities the siege materials he created during the winter – the entire objective of his campaign now being to take the place known as Phthiotic Thebes. This city is situated a short distance from the sea, about three hundred stades from Larisa; it is well placed for both Magnesia and Thessaly, and particularly as regards the territory of Demetrias in Magnesia and Pharsalos and Pherai in Thessaly. […] Philip was very keen to capture it by force. When a hundred and fifty (*sc.* bolt-firing) catapults and twenty-five rock-projecting engines had been amassed, he approached Thebes, where he divided the army into three parts and occupied the environs of the city; one division was stationed at the Skopion, one at the so-called Heliotropion, and the third on the mountain overlooking the city. The intervals between the camps he fortified with a trench and a double palisade; additional safeguarding was provided by wooden towers, which, with an adequate guard, he positioned every plethron. He then brought all his prepared equipment together and began to convey his machines towards the citadel. (100) For the first three days he was unable to make any progress in the operations, because those in the city were defending themselves with reckless gallantry; but when some of the combatants from the city had fallen and others had been seriously wounded, because of the continuous skirmishing and the quantity of projectiles, the brief ensuing respite allowed the Macedonians to begin their mines. By continuous exertion, despite the difficulty of the terrain, nine days' hard work saw them reach the wall. After this they did their work by relays, not stopping either during the day or at night, and in three days they had undermined and underpinned two plethra of the wall. The props were unable to support the weight and gave way, resulting in the wall falling before the Macedonians had set fire to them; but after they had briskly cleared away the debris and made ready their entrance – and were on the brink of mounting the attack – the terrified Thebans surrendered their city.

(Plb. 5.99–100, lightly abridged)

At Meliteia (Plb. 5.97.5–6) Philip had got one key thing right – arriving by surprise (Ph. would have approved: D2–4 [*96.28–37*]) – but another so wrong that Polybius devoted a scornful excursus to it: the stupidity of a commander who planned an escalade with ladders too short for the walls. See Plb. 5.98 (positively expanded at 9.19.5–9), and cf. 4.70–72 for Philip's successful escalade-based strategy at Psophis, eighteen months earlier. At Phthiotic Thebes too, as we see, not quite everything went to plan, at the stage of firing the props (contrast Pale, where likewise two hundred feet of wall had been undermined and, on that occasion, fired at the right time: 5.4.6–9). Otherwise, though, the precocious young king emerged with his reputation restored; and the episode as a whole can serve as representative of those where the attacking side held the upper hand during most if not all of the proceedings, and achieved its objective in short order.

Turning abruptly, as he does in part D, from defence to attack, it is this sort of clearcut success that Ph. claims for the advice he now gives ('Anyone besieging cities in this way is especially likely to capture them while suffering nothing ruinous himself': D111 [*104.40–42*]). As with part C (q.v. Introduction), he is not likely to have been drawing on personal experience, nor even breaking significant new ground in theoretical/intellectual terms. On the contrary, this was a field in which, again and again, the old, tried-and-tested ideas were still often found to be the best. This meant surprise, above all; failing that, blockade and/or collusion as alternatives to frontal assault. But even without careers like that of Philip V (great-grand-

son of Demetrius Poliorcetes) to serve as a reminder, sometimes a combination of the personality of the commander and the particular circumstances facing him did lend weight to the option of direct attack. Thus, for most of the time here (D5–71 [*96.37–102.8*], D86–110 [*103.12–104.40*]), that is the general scenario envisaged – within which, in many specifics, Ph.'s recommendations envisage the attacking troops seeking to counter the very tactics that his part C has enjoined on the defenders.

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D1 [96.27–28]: introduction

D1.1–2 [*96.27–28*] **Πρὸς μὲν οὖν πολιορκίαν οὕτω δεῖ παρακευάζεσθαι** ('So that is how one must prepare oneself for (withstanding) a siege'). Previous translators have all taken οὕτω here as prospective: 'Auf eine Belagerung soll man sich nun *folgendermassen* vorbereiten' (Diels-Schramm 66), '*Voici* comment il faut se préparer pour un siège' (Garlan 315), and 'It is necessary to prepare for a siege *as follows*' (Lawrence 99, and W.M. Murray, *Age of Titans* 296); my emphases. Yet in Ph. οὕτω is typically retrospective: see A19.1 [*80.51*], A33.7–8 [*82.20–21*], A57.1–2 [*84.1–2*], B3.3–4 [*86.34–35*], B4.3 [*86.37*], B9.5 [*87.1*], B24 [*87.49–51*], C50 [*94.34–35*], C61 [*95.28–29*], D8.5–7 [*97.5–7*]; also e.g. *Bel.* 69.7, 71.38. Prospective instances – 'as follows', in effect – can be found (*Bel.* 55.28, 64.9) but are much rarer. The present passage in fact has a very compelling parallel in B24 (above), Τοὺς μὲν οὖν σιτοβολῶνας οὕτω κατασεκευαστέον ἐστίν, where only one interpretation is possible: the adverb marks the end of one topic before Τυγχάνει δὲ κτλ begins another. I am therefore convinced that the same is true here. (I have also ventured to supply Τὸν <δὲ> μέλλοντα λήψεσθαι τὰς πόλεις at the start of the next sentence, D2.1 [*96.28*], as (e.g.) Schoene did in C15.2 [*92.9*].)

Ph.'s actual phrase πρὸς πολιορκίαν παρασκευάζεσθαι *in this defensive sense* – the verb can of course, in context, apply equally well to the besieger(s) – is hard to parallel verbatim, but cf. Diod.Sic. 14.48.1 on Motya facing Dionysius I in 397 (πρὸς τὴν πολιορκίαν παρεσκευάζοντο) and Plb. 14.9.9 on Carthage in 203, where some urged siege-preparations against the Romans (τὴν δὲ πόλιν ὀχυροῦν καὶ παρασκευάζεσθαι πρὸς πολιορκίαν). See also, variously (e.g.): Xen. *Hell.* 2.2.4 (of the Athenians facing blockade in 405: ἐκκλησίαν ἐποίησαν, ἐν ᾗ ἔδοξε … πάντα ὡς εἰς πολιορκίαν παρασκευάζειν τὴν πόλιν); Diod.Sic. 17.23.6 (Memnon prepares Halikarnassos against Alexander in 334: παρεσκευάζετο πάντα τὰ χρήσιμα πρὸς πολιορκίαν ἐν τῇ πόλει) and 18.51.4 (the people of Kyzikos face a Persian satrap in 319: βέλτιον παρεσκευάσαντο τὰ πρὸς τὴν πολιορκίαν).

D2–4 [96.28–37]: taking the enemy by surprise

D2–4 is essentially about *klopê*, a theme returned to later (D73–75 [*102.12–27*]). For the echos in *Par.Pol.* 212.11–214.3 (12.1–25) see **Appendix 3** passage no.5.

D2.1 [*96.28*] **Τὸν <δὲ> μέλλοντα λήψεσθαι τὰς πόλεις** ('He who intends to capture cities'). On my suggested supplement here see under D1 **πρὸς μὲν οὖν**.

D2.2 [*96.29*] **ἐὰν προέληται** ('for preference'). Like Garlan 315, I see no necessity for Diels's supplement ἐὰν προέληται <ῥᾳδίως λαβεῖν> here, printed in Diels-Schramm 66. The apparatus there cites a putative alternative, εὐκόπως πορθεῖν, from the paraphrase in *Par.Pol.* 212.11 (12.1) – and it may be noted that εὐκόπως is an adverb that Ph. uses four times in *Bel.* (56.16, 57.14, 72.29 & 31); however, the Byzantine writer's whole phrase Τὸν δὲ βουλόμενον εὐκόπως πορθεῖν τὰς πόλεις is generated by Ph.'s Τὸν <δὲ> μέλλοντα λήψεσθαι τὰς πόλεις, so εὐκόπως πορθεῖν equates to λήψεσθαι there; cf. Sullivan, *Siegecraft* 181.

D2.2–3 [*96.29–30*] **μάλιστα μὲν ἑορτῆς οὔσης ἣν ἄγουσιν ἔξω τῶν πυλῶν** ('during a festival which they are celebrating outside the gates'). Ph.'s hard-nosed advice shows no trace of the piety which in previous centuries had usually meant that the exigencies of warfare showed due respect to festivals and other religious observances. (On the mind-set see e.g. Pritchett, *War* 1.116–126, esp. 121–126; A.J. Holladay and M.D. Goodman, 'Religious scruples in ancient warfare', *CQ* 36 (1986) 151–171, at 152–160.) Violations, though, are in fact attested in all periods. The example from Ph.'s own day cited by Chaniotis, *War* 161 – an attack on Dreros by its northern neighbour Milatos in c.220, on the first day of the new year (I.Cret. I ix 1) – differs little from the Peloponnesian-War one in Thuc. 3.56.2 and 3.65.1, on the Thebans' 431 unlawful incursion into Plataiai 'in peace-time and at a sacred time of the month' (ἐν σπονδαῖς καὶ ἱερομηνίᾳ). See also e.g. Front. *Strat.* 3.2.7 (ostensibly Epaminondas at an unspecified city in Arcadia in 379, though in Polyaen. 2.3.1 and 2.4.3 the same anecdote, apparently, takes place at Thebes) and 3.2.8 (Aristippus the Spartan at Tegea, date indeterminable).

The specificity of Ph.'s recommendation, addressing a city's particular vulnerability on such extramural occasions, had been recognized from a defence perspective by Aeneas Tacticus. One of his martial-law proclamations declared baldly that 'festivals are to be celebrated in town' (Τάς τε ἑορτὰς κατὰ πόλιν ἄγειν: Aen.Tact. 10.4 (cf. 17.1), with Whitehead, *Aineias* 118: '[t]his is doubtless to be envisaged as the imposition of uniformity upon a mixed pattern of rural and urban locations'). Again Thucydides supplies an apposite illustration, on the Athenians' response to the revolt of Mytilene in 428: 'it had been reported to them that there was a festival of Apollo Maloeis outside the city [ἔξω τῆς πόλεως], which the Mytilenians celebrate *en masse*; so there was a hope of attacking them by surprise, probably successfully' (Thuc. 3.3.3). (In the event, the Mytilenians were forewarned and cancelled their celebrations: 3.3.5.) See also (e.g.): Polyaen. 6.45, on Syloson (I) making himself tyrant of Samos (in c.590: Shipley, *Samos* 68, 71) by exploiting a festival at the Heraion, 'which was rather far from the city' (πορρωτέρω τῆς πόλεως ὄντι); D.C. 27.93.4, where in the late second century Athenion the slave leader attacks Messana during a festival taking place 'in the suburbs' (ἐν τῷ προαστείῳ), and almost captures it.

D2.3–4 [*96.30–31*] **εἰ δὲ μή, ἀμητοῦ <ἢ> τρυγητοῦ ὄντος τὴν ἐπίθεσιν ποιεῖσθαι** ('otherwise, at (grain-)harvest <or> vintage time'). Though what the manuscripts transmit here, ἅμα τοῦ τρυγητοῦ, is not intolerable, this emendation and (necessary) supplement, by Buecheler ap. Schoene, has been accepted by all. For ἀμητοῦ … ὄντος cf. ἀμήτου γενομένου in Joseph. *AJ* 5.324 (the story of Ruth).

Ph.'s general point, of the vulnerability of cities during harvest-time of any kind, again (as Bettalli, *Enea* 228 notes) takes up an Aenean scenario: 'when the countryside is full of produce, with an enemy in the vicinity, it is likely that many of the townsfolk will remain in nearby places, anxious about their crop' (Ὅταν δὲ ἡ χώρα ἐγκάρπως διακέηται, μὴ πόρρω ὄντων πολεμίων, εἰκὸς πολλοὺς τῶν ἐν τῇ πόλει περὶ τοὺς ἐγγὺς χώρους διατελεῖν, γλιχομένους τοῦ καρποῦ: Aen.Tact. 7.1, with 7.2–5 on how best to gather them inside the city). Xen. *Hell.* 7.5.14 offers an instance of what Aeneas had in mind: in 362 the Spartan commander Archidamus – subsequently King Archidamus III – predicts that the Mantineians and their flocks would all be outside (ἔξω), 'especially as it was time to collect the grain' (ἄλλως τε καὶ σίτου συγκομιδῆς οὔσης). As to Ph.'s mention of the relevance of the vintage, too, it is illustrated by what Thuc. 4.84.1–2 writes about Akanthos in 424: Brasidas made his move against the place 'shortly before vintage-time' (ὀλίγον πρὸ τρυγήτου), and the Akanthians' response to this was coloured by the fact that they were fearful about their crop (cf. Aeneas above) which was still outside (διὰ τοῦ καρποῦ τὸ δέος ἔτι ἔξω ὄντος).

D3.1–3 [*96.31–33*] **πλείστους γὰρ ἔξω τῆς πόλεως ἀπολαβὼν ἀνθρώπους ῥᾳδιέστατ' ἂν λάβοις τὸ ἄστυ** ('for by intercepting most of the people outside the city you might most easily capture the town'). The version of this in *Par.Pol.* 212.11–16 (12.1–6) – see **Appendix 3** passage no.5 – briefly elaborates it with a second scenario, which Ph. himself may or may not have had in mind: taking hostages/prisoners, and releasing them for a ransom.

D4.1–3 [*96.33–35*] **εἰ δὲ μή, νυκτός, χειμῶνος ὄντος ἢ μεθυόντων τῶν πολεμίων ἔν τινι δημοτελεῖ ἑορτῇ** ('otherwise, at night, when there is a storm or when the enemy are drunk at some public festival'). If the text is sound, i.e. without another ἤ after νυκτός, Ph. is talking about night-attacks (Εἰ δὲ κατὰ κλοπὴν νυκτὸς τὴν πόλιν βουλόμεθα λαβεῖν in the *Par.Pol.* paraphrase, 212.16–17 (12.6–7): see **Appendix 3** passage no.5), which are of two kinds: either during a storm or during the kind of (*sc.* intramural) festival where wine flowed freely. Diels-Schramm 66 and Garlan 315–316 convey this accurately in their translations, as I have sought to do myself; that of Lawrence 99 ('(either) by night during a storm, or when the enemy are drunk etc.') re-groups the three elements.

Surreptitious – see the next lemma – nocturnal attacks are of course commonplace in the historians; the Thebans at Plataiai in 431 is a classic (Thuc. 2.2–6, cf. Aen.Tact. 2.3–6). Aeneas had devoted appropriate thought to night-time security from a defenders' point of view (e.g. 1.8, 9.1, 10.4, 10.10, 10.25, 16.2, 18.2, 22.1). Much the same is true, if perhaps to a lesser extent overall, of Ph. himself (C30 [*93.11–23*], C35 [*93.36–41*], C42 [*94.10–12*], C60 [*95.25–28*]), who now in part D considers the hours of darkness an opportunity for the aggressors to act. Besides the present passage see D73.1 [*102.12*], D94 [*103.35–37*], D99 [*103.45–50*] and D102

[*104.6–9*]. Compare generally Onas. 41.1–2, who declares nocturnal attacks generally advantageous to the attacking side.

The combination of night-time and χειμών has already been mentioned in C60.1–2 [*95.25–26*]. Diels-Schramm 64 translate that instance as 'Sturm' but the present one (at 66) as 'Winterszeit', and it appears that the author of the *Par.Pol.* understood it likewise: his elaboration (212.18–20 (12.8–10)) is χειμῶνος καταλαβόντος ὅτε τῷ κρύει τούτων οἱ πλείους ἐν ταῖς οἰκίαις συστέλλονται καὶ ἀπαράσκευοι πρὸς μάχην τυγχάνουσιν ('in wintertime when, because of the cold, the majority of the citizens are gathered in their homes and unprepared for battle': Sullivan). I am nevertheless confident that storm (vel sim.) is what Ph. meant in both passages, as Garlan 314 and 315 also presumes. The noun itself is inherently ambiguous, to be sure (see LSJ s.v.), and some parallels such as Thuc. 3.21–23 (a counter-attack by the defenders of Plataiai) confuse the issue by taking place *both* in winter *and* on a dark and stormy night. (For a successful attack during winter, surprising the defenders for that very reason, see Plb. 4.70–72 on Philip V at Psophis in 219/8.) Even so, there is an inherent implausibility in Ph.'s having ruled out surprise attacks in summer months. Note also *Sylloge tacticorum* 53.1: the military commander of a besieged city must pay particular attention to security ἐν ταῖς χειμερίοις καὶ ἀσελήνοις ἢ καὶ ἑορτασίμοις νυξίν.

Ph's other scenario for a successful surprise attack at night, subsumed in that *Syll.tact.* phrase, is not confined to any particular time(s) of year but simply requires the defenders to be the worse for drink, during a public festival. (The *Par.Pol.* version adds the option of their being absorbed in playing ritual games (213.1 (12.12)) – probably unlikely during the night.) In specifying a δημοτελὴς ἑορτή (for which concept cf. e.g. Thuc. 2.15.2; Dion.Hal. *AR* 2.70.2, 3.32.4, 6.1.4, 7.11.3; Joseph. *AJ* 2.45, 5.235; OGIS 56, line 41; SEG 26.1334, line 9) he is less likely to be drawing attention to the financing of such festivals *per se* as identifying them as occasions of mass participation; cf. the *Par.Pol.*'s πανδήμου ἑορτῆς ἐν τῇ πόλει τελουμένης (212.20 (12.11)).

What Ph. advocates under this last head has numerous illustrations in the historical record, Greek and Roman alike (for a Roman instance see Liv. 8.16.9–10 on Cales, captured in 334 *festo die* when the enemy were *vino epulisque sopitos*), but is perhaps most perfectly exemplified by Polybius's account of the (eventual) Roman capture of Syracuse: see under the next lemma.

D4.3–5 [*96.35–37*] **κλίμακας ἑτοίμους ἔχοντας λάθρα πλησιάσαντας τῷ τείχει τῶν πύργων τινὰς καταλαβέσθαι** ('approach the wall secretly with ladders ready and seize some of the towers'). Schoene printed the paradosis ἑτοίμας, while noting the marginal correction ἑτοίμους in PV. Diels-Schramm 66 preferred the latter; likewise, implicitly, Garlan 315. I follow the majority view, but for ἑτοίμας cf. Plb. 4.18.3 (the Aitolians at Kynaitha in 218), τὰς κλίμακας ἑτοίμας ἔχοντες.

As regards substance, compare Plb. 8.37 (here abridged) on the Romans at Syracuse in 212: 'a deserter disclosed that for three days those in the city had been celebrating a mass sacrifice (θυσία πάνδημος) in honour of Artemis, and that while their consumption of bread was sparing because of its scarcity, that of wine was copious. […] Marcellus, thinking it probable that the people would be drunk, given their

indulgence and the lack of solid food, decided to try his luck. Swiftly two ladders were constructed, of a suitable fit to the wall. […] The ladder-bearers safely planted them against the wall unobserved, and then the men whose duty it was to scale it began their task unhesitatingly. […] At first, proceeding along (the wall), they found the sentry-posts deserted; this was because the guards had congregated in the towers, for the sacrifice, where some were still drinking and others drunk and asleep long since. So, suddenly and quietly falling upon those in the first tower and in the one next to it, the attackers killed most of them without being noticed; and when they reached the Hexapyla (gate) they descended, forced open the first postern that is built-in (to the wall) there, and admitted through it both the general and the rest of his army'. See also on this episode Plut. *Marcell.* 18, Liv. 25.23.8–24.7, Polyaen. 8.11, Front. *Strat.* 3.3.2. Another illuminating one, in general terms, is Polyaen. 4.6.18 on the successful capture of Kassandreia (the former Poteidaia) by Antigonus Gonatas in the mid 270s.

From the defenders' standpoint, a concern that 'part of the wall or of the towers' (τι τοῦ τείχους ἢ τῶν πύργων) might be captured in this sort of way has been expressed at C20.1–2 [*92.29–30*].

In the present passage – just as in Polybius's narrative – nothing suggests that the ladders are anything but the standard type of wooden *klimakes*, but when the topic returns in D73 [*102.12–19*] the ladders are of a strange, impracticable-sounding design; see the Comm. thereto.

D5–11 [96.37–97.34]: preliminary logistics

D5.1–2 [*96.37–38*] **Ἐὰν δὲ ἀποτύχῃς τούτου** ('If you fail in this'). Or else if, simply, another strategy is preferred. (Further ifs follow: see under the next two lemmata.)

D5.3–5 [*96.39–41*] **ἐὰν μὲν ἐπιθαλάσσιος ᾖ ἡ πόλις, περιχαρακώσαί τε ἐκ θαλάσσης εἰς θάλασσαν, καὶ ἐὰν ἔχῃς σκάφας μακράς, ἐπὶ τοῦ λιμένος ἐφορμεῖν, ἵνα εἰσπλέῃ μηθέν** ('if the city is by the sea, palisade it round from sea to sea, and if you have warships, anchor them at the harbour, in order that nothing can sail in'). The first alternative option now presented comes into play if the target city is coastal; cf. C51.1–2 [*94.36–37*] from the defenders' side. Nevertheless, on Schoene's standard emendation of the wrongly transmitted περιχωρῆσαι (Diels ventured περιχῶσαι but even Diels-Schramm 66 do not print it), the phrase περιχαρακῶσαί τε ἐκ θαλάσσης εἰς θάλασσαν uses a verb that is equally applicable in terrestrial assaults: see D6.3–4 [*94.44–45*] (of one's own camp), D84.1 [*103.4*], and elsewhere e.g. Diod.Sic. 19.68.1 (the Aitolians at Agrinion in 314). See also Plb. 10.9.7 on Scipio Africanus at Carthago Nova in 209: 'he encamped to the north of the city, defending the outer edge of the camp by a trench and a double palisade ἐκ θαλάττης εἰς θάλατταν'. That phrase, also used by Ph. here, is something of a commonplace in itself: cf. e.g. Diod.Sic. 13.66.1 (the Athenians at Chalkedon in 409: ἀπετείχισαν τὴν πόλιν ἀπὸ θαλάττης εἰς θάλατταν ξυλίνῳ τείχει), 14.18.2 (retrospectively on Syracuse in 415–413: τὴν πόλιν ἐκ θαλάττης εἰς θάλατταν ἀποτετειχισμένην), and 19.36.1 (Cassander at Pydna in 317: τὴν μὲν πόλιν περιεχαράκωσεν ἐκ θαλάττης εἰς θάλατταν; again 19.49.1; see D84 under **φύλακας**); Arr. *Anab.* 2.1.2 (Memnon at

Mytilene in 333: τὴν μὲν πόλιν χάρακι διπλῷ ἐκ θαλάσσης ἐς θάλασσαν ἀπετείχισε); Plut. *Crass.* 10.8 (Crassus vs Spartacus at Rhegion in 72: τάφρον ἐμβαλὼν ἐκ θαλάσσης εἰς θάλασσαν, with a 'wall' to follow).

Note also Plb. 4.56.8, quoted at C51 under **ἀποχαρακοῦν**, for a precaution taken by the *defenders* of a city (Sinope) described by the verb περιχαρακοῦντες.

In conjunction with such palisading, Ph. advises that some of the attackers' ships block access into (or out of) the harbour. He regards warships (a category of vessel for which he has a varied and unsystematic vocabulary: cf. e.g. D22 [*98.27–31*], D29 [*99.6–10*], D103 [*104.9–19*], and see generally W.M. Murray, *Age of Titans* 132) as best for this task, though one imagines that other kinds of craft could have sufficed. (D101 [*104.1–6*] will recommend a way for attackers to close off a harbour's mouth by using 'cargo-vessels <or> whatever boats you may have that are suitable for this'.) For ἐφορμεῖν, aggressive anchoring which amounts to blockading, cf. C60.2 [*95.26*] and C61 under **μάλιστα**.

D6.1–3 [*96.42–44*] **Ἐὰν δὲ μηδ' οὕτως ἡ πόλις ᾖ ἐκτισμένη, βαλόμενος τὸ στρατόπεδον ἔξω βέλους ἐπὶ τοὺς ἀσφαλεστάτους τόπους** ('But if the city is not situated thus, position the camp out of range in (one of) the most secure places'). Sullivan, *Siegecraft* 169 detects a faint echo of Ph.'s ἐπὶ τοὺς ἀσφαλεστάτους τόπους and what follows it here, especially ποιοῦ τὴν πολιορκίαν, in the *Par. Pol.*: see **Appendix 3** passage no.2, with τὴν τοῦ ἰδίου λαοῦ πρὸ πάντων ἀβλαβῆ ποιούμενον φύλαξιν τῆς πολιορκίας ἀπάρχεσθαι (204.9–10 (4.5–7)).

For ἔξω βέλους cf. e.g. Diod.Sic. 20.6.3, 20.49.5, 20.86.3; Plut. *Pomp.* 78.2; Arr. *Anab.* 2.27.1; D.C. 50.32.4, 56.11.5. The variant ἐκτὸς βέλους will be used at D68.1 [*101.37*]; LSJ s.v. βέλος has others.

D6.3–4 [*96.44–45*] **περιχαρακώσας κύκλῳ ὡς ἂν ᾖ δυνατόν** ('encircling it with a palisade as far as is possible'). See D5 under **ἐὰν μὲν ἐπιθαλάσσιος**. Though Ph. does not use the term himself, a χαράκωμα is a common term elsewhere, from Xenophon onwards, for a camp surrounded by a (trench and) palisade.

D6.5–7 [*96.46–48*] **πρῶτον μὲν κήρυγμα ποιησάμενος μηθένα φθείρειν ἢ προνομεύειν** ('First, make a proclamation that nobody is to ravage or forage'). In context here, these twin prohibitions must apply to mischief that the attacking troops might otherwise make in the territory at large. Even so, they beg obvious comparison with the advice which will be given in D70 [*101.42–102.2*] about maintaining discipline during the actual capture of the city; and the reasoning given there – a concern not to alienate the defeated defenders unnecessarily – is equally applicable here, as D7.2–4 [*96.50–97.1*] goes on to show. Compare, respectively, Onas. 10.7–8 and 35.1–3.

Intransitive φθείρειν, as here and again in D10.11 [*97.29*] (contrast B53.6–7 [*90.19–20*] on fouling an advancing enemy's sources of water, τὸ φθείρειν πολεμίων ἐπιπορευομένων τὰ ὕδατα, and the figurative application to bribery and corruption in D96 [*103.39–42*]), means simple destruction, usually agricultural; cf. Garlan 24. (I doubt whether Diels-Schramm 67 were right to understand it here as 'umzubringen', kill.)

The other verb Ph. uses here, προνομεύειν, is somewhat rarer, but Onas. 10.7–8 (above) uses it, and the historians furnish episodes where commanders, for one reason or another, impose "Philonian" restraint on their troops *vis-à-vis* this activity. Witness e.g.: Diod.Sic. 13.109.3 (Dionysius I when aiding Gela against the Carthaginians in 405: τὴν χώραν οὐκ εἴα προνομεύεσθαι); Polyaen. 3.10.5 (a settled policy of the fourth-century Athenian general Timotheus: see D7 under **καὶ οἱ**); and Plb. 3.90.2 (Q. Fabius Maximus when shadowing Hannibal in 217: ἔχων δὲ κατὰ νώτου τὰς χορηγίας ἀφθόνους, οὐδέποτε τοὺς στρατιώτας ἠφίει προνομεύειν κτλ). In the present instance Diels-Schramm 67 translate προνομεύειν as 'plündern' and Lawrence 101 as 'loot', which seems to take its semantic scope too close to the cluster of terms that cover serious booty and plunder (Pritchett, *War* 5.73–152, 'Vocabulary for booty'). This is simply hand-to-mouth foraging, for food. Ph. will go on immediately to make suggestions to ensure that the army does get enough to eat, by orderly and managed means: see the next two lemmata.

Proclamations of other kinds will be recommended in D9.3–5 [*97.11–13*] and D12–16 [*97.34–98.4*], and cf. also D76.4 [*102.30*].

D6.7–8 [*96.48–49*] **Δεύτερον δὲ λογισάμενος εἰς τάγματα ἢ ἐπαρχίας διαδώσεις τὰ γεώργια** ('Secondly, calculate the agricultural produce and distribute it between (your) formations or command-units'). The verb λογίζεσθαι, so often applied by extension to non-numerical estimates, does sometimes – and according to LSJ s.v., I.1, properly – designate numerical calculations. The present passage could be appended to Aristoph. *Nub.* 20 and the other (classical-period) ones given there.

What the commander of the besieging forces must calculate are τὰ γεώργια. I have followed Garlan 316, 'les produits des champs', in my translation of it here, though its primary meaning appears to be the fields or orchards where they are grown (LSJ s.v., I), as in e.g. Strab. 14.5.6: 'die Ländereien' (Diels-Schramm 67). Lawrence 101 combines both elements in 'the fields (with their produce)'.

As regards the proposed distribution εἰς τάγματα ἢ ἐπαρχίας, it is one of Ph.'s very few insights into the internal organization of the attacking army that he envisages. The first of these terms, τάγματα, reappears at D89.3–4 [*103.27–28*], τὰ δὲ ἄλλα τοῖς στρατιώταις εἰς τάγματα διάδος, and also in e.g. Xen. *Mem.* 3.1.11 (Socrates asks whether Dionysodorus's lecture on generalship had included how to use each of an army's *tagmata*) and Plb. 3.85.3 (*tagmata* in Hannibal's army). Though it apparently does not, of itself, denote a unit of any particular size, subset or function – witness its Roman application, in different authors, to both the maniple and the legion (LSJ s.v.) – Garlan 393 n.6*b* is probably right to visualize a *tagma* in the present context as a unit smaller than the other term Ph. uses (here only), an *eparchia*. (This too will be intended by him as a broad-brush one, since again Garlan is doubtless correct to see no connection with the well-attested Seleucid sense of *eparchiai* as (large) territorial districts.)

D7.1–4 [*96.49–52*] **καὶ οἱ στρατιῶται πάντα τὰ δέοντα ἕξουσιν καὶ οἱ πολῖται θᾶττον ὃ βουλόμεθα ποιήσουσιν ἀφθάρτων τῶν κτημάτων ὄντων** ('and (thus) the soldiers will have everything they need and the (enemy) citizens will more quickly do what we want because their property is undamaged'). These desirable

consequences will of course flow not from the immediately-preceding advice given (Δεύτερον δὲ κτλ), about the mechanics of distribution, but from the initial prohibition on ravaging and foraging. Compare generally Onas. 6.10–12 (and 10.7–8). The reality was often different: see Chaniotis, *War* 124–125.

Both of the claims that Ph. makes have a close parallel in what Polyaen. 3.10.5 says about Timotheus (see D6 under **πρῶτον**): 'when Timotheus invested a city he would set apart the place for his troops to forage; the remaining part of the countryside and what was useful in it he would sell. Nor did he permit them to raze a house or (other) dwelling, or even to cut out a cultivated tree, but only to take the fruits. And this strategy had the following results for him: if he won he could impose larger levies, but if the war dragged on he would have ample food and accommodation. More importantly still, this was how he sought great goodwill from the enemy' (Τιμόθεος πόλιν περιστρατοπεδεύσας ἀφώριζε τὸν τόπον τοῖς στρατιώταις, ὅθεν δὴ προνομεύσουσι· τὸ δὲ λοιπὸν μέρος τῆς χώρας καὶ ὅσον ἦν ὄφελος αὐτῆς ἀπεδίδοτο. Οὐκ ἐπέτρεπε δὲ οὔτε οἰκίαν οὔτε ἔπαυλιν καθαιρεῖν, οὐ μὴν οὐδὲ ἥμερον δένδρον ἐκκόπτειν, ἀλλ᾽ αὐτοὺς τοὺς καρποὺς λαμβάνειν. Καὶ τάδε οἱ στρατηγοῦντι περιῆν· εἰ μὲν κρατοίη, πλείους φόρους ἐκλέγειν, εἰ δὲ ὁ πόλεμος μηκύνοιτο, τροφὰς ἀφθόνους καὶ καταγωγὰς ἔχειν. Τὸ δὲ τούτων μεῖζον, πολλὴν τὴν εὔνοιαν παρὰ τῶν πολεμίων ἐθήρευεν). See also, more briefly, Polyaen. 3.10.9 on T. at Samos in 365: ἐξελὼν χωρίον ἐς προνομήν. A fragmentary provision, block B col.2, in the Macedonian army regulations from Amphipolis (ISE 114: see C28 under **<ἐν> αἷς**) seems to deal severely with unauthorized foraging and related misbehaviour.

D8.3–4 [*97.3–4*] **τὰ μὲν κατασκάψαντας, τὰ δὲ ἐκκόψαντας** ('eradicate some items and cut out others'). The first of these verbs, κατασκάπτειν, is one Ph. uses only here; for the second, ἐκκόπτειν, see already A9.6 [*80.16*] and A42.3 [*83.5*], and again D50.3 [*100.24*]. The first two of those passages concern the damage done by artillery, but the third, despite some textual obscurity, entails a usage comparable with what seems to be intended here. The distinction is between purely destructive obliteration (cf. LSJ s.v. κατασκάπτω II) and removal for another putative purpose.

D8.4–7 [*97.4–7*] **τὰ ὕδατα τὰ ἔσω ῥέοντα ἀποστρέψαντα (οὕτω γὰρ [ἂν] μάλιστα δειλωθήσονται καὶ σὺ τοῖς ὀργάνοις ὡς βούλει χρήσῃ)** ('divert the waters that flow in – for thus they will be especially frightened and you, if you want, can (more easily) use your engines'). These 'waters that flow in' can hardly be other than rivers or streams; thus the possibility, stated next, of a *potamos* nearby (see the next lemma), means exactly that, a river which without malign intervention would be close to the city but outside it. For the verb ἀποστρέφειν of diverting a river cf. Syll.[3] 839 (I.Eph. 274), from Hadrianic Ephesos: this has been (benignly) done to the R. Kaÿstros, which had been silting up the harbours (lines 13–15) – and indeed continued to do so.

Ph.'s parenthetical clause appears to offer a double rationale for this step. The first element, a matter of the defenders' morale (on δειλωθήσονται here see the asterisked footnote at A15 under **ἀπὸ τῶν**), is self-explanatory. The second seems an oddity as stated, given that 'engines' required solid, dry ground to move effectively, so Lawrence 101 might be right to regard καὶ σὺ κτλ as making a suggestion ancil-

lary to the explanation proper: 'because they will be very frightened on that account – and if you think fit, make use of your instruments (to frighten them more)'.

In the best-known episode of this kind, Cyrus at Babylon in 538, the reason Herodotus gives for his diversion of the Euphrates into a nearby marsh (Hdt 1.191.3–4) is to enter the city along the river-bed. (Polyaen. 7.6.8 implausibly highlights a different issue: the Babylonians capitulate because of lack of drinking-water, πιεῖν ὕδωρ οὐκ ἔχοντες. For that, see rather e.g. Plb. 5.71.9–10 on Antiochus III at 'Rabbatamana' – a.k.a. Philadelpheia; present day Amman – in 218, and [Caes.] *BG* 8.40–43 on Julius Caesar at Uxellodunum in 51. Iotapata in 67 CE, according to Joseph. *BJ* 3.181–189, had enough food but risked running out of water; Vespasian hoped for precisely that; Josephus's bluff was to hang out wet laundry, to give the impression that water was plentiful.) Other, comparable instances where access by 'machines' is the issue are furnished by Diod.Sic. 13.86.3 (the Carthaginians at Akragas in 406 filled in the river which ran beside the walls, to that end) and 16.49.1 (Lacrates does much the same at Pelusium in 350/49, first diverting and then filling in a canal and then bringing up his *mêchanai*).

D8.7–9 [*97.7–9*] **ἐὰν ᾖ ποταμὸς πλησίον, ἐπὶ τὸ τεῖχος <ἐφεῖναι>, ἵνα ἐὰν δύνῃ πεσόντος μεταπυργίου τινὸς ἢ πύργου κατάσχῃς τὴν πόλιν** ('if there is a river nearby, <channel it> against the wall, in order that, if you can, you may gain possession of the city after the fall of a curtain or a tower'). The classic illustration of this is what King Agesipolis I and the Spartans did, successfully, at Mantineia in 385 (Xen. *Hell.* 5.2.4–5). The wall there was brick, as ideally the tactic requires. See also Paus. 8.8.7–8, who adds (8.8.9): 'Agesipolis was not the originator of this stratagem; it had been discovered earlier, by Cimon the son of Miltiades, when [c.476] he was besieging the Boges the Mede and the other Persians who were holding Eion on the Strymon. Agesipolis copied something established and celebrated by the Greeks'.

For other anecdotes 'about the diverting of rivers' (*de fluminum derivatione*) see in brief Front. *Strat.* 3.7.1–5.

D9.2 [*97.10*] **τότε τὰ βέλη ἐπιστήσας πάντα** ('then is the time to put in place all your artillery'). See C1 under **ἐφιστάναι**.

D9.3–5 [*97.11–13*] **ἐπικηρύξας τῷ πρώτῳ ἀναβάντι ἐπὶ τὸ τεῖχος καὶ δευτέρῳ καὶ τρίτῳ δώσειν τὰ καλῶς ἔχοντα χρήματα** ('announce that the well established monies will be given to the first and second and third man who climbs up the wall'). The concept of giving out things that are 'well established', τὰ καλῶς ἔχοντα, also conveys the idea that they are admirable, established well. (Lawrence 101 has 'handsome amounts of money'.) It recurs in D14.4–5 [*97.48–49*], of rations (ἐπιτήδεια).

As Garlan 394 n.9*a* comments, the basic idea of 'les récompenses militaires … déjà tarifiées, déjà institutionnalisées' can be seen in such documents as the Macedonian army regulations from Amphipolis (ISE 114: C28 under **<ἐν> αἷς**), block A col.3, and in the agreement between Eumenes I of Pergamum and his mercenaries (OGIS 266: C48 under **μάλιστα**), while Plb. 10.11.6 on Scipio Africanus at Carthago Nova in 209 illustrates the Roman approach to wall-related incentives

(as here in Ph.) in particular: 'he promised gold crowns to the first men who climbed up onto the wall and the customary rewards (τὰς εἰθισμένας δωρεάς) to those displaying conspicuous bravery'. For Roman practice see also Plb. 6.39.5 ('to the first men to climb up onto the walls when a city is being attacked (the commander) gives a gold crown' – the *corona muralis* of Liv. 10.46.3, 23.18.7, 26.48.5–13, etc.; HCP 1.721) and Caes. *BG* 7.27 on his siege of Avaricum in 52 (*eis qui primi murum ascendissent praemia proposuit*). But in Greek campaigning too the idea has a long history. (This is the context in which, presumably, Onas. 42.16 belongs: when precipitous natural cliffs that form part of a city's fortifications offer scope for attackers to gain entry, a good general encourages his boldest and most agile men, with promise of reward, to climb up either by exploiting the natural hand- and foot-holds or on ladders.) Here are three classical-period instances.

(i) At the Lekythos fort, Torone, in winter 424/3, Brasidas 'announced, when he was about to make the assault, that he would give thirty minas of silver to the first man who climbed the wall' (Thuc. 4.116.2). Gomme in HCT 3.591–592 found this 'a remarkably large sum to be promised a soldier (who might earn 1 dr. a day, so this is equal to 3,000 days' pay) in an enterprise that we cannot believe to have been either desperate or of the first importance', and he was tempted by J.P. Mahaffey's suggested emendation to four minas (i.e. Δ for Λ – the reverse of a standard change here in a passage of Ph.: see C57 under **ἐν ᾧ**). A similar numerical solution, by D.M. Lewis (τριάκοντα usurping τρεῖς, three), is noted by S. Hornblower, *A Commentary on Thucydides* 2 (Oxford 1996) 355, who himself concurs with Pritchett, *War* 2.289 n.55, cf. 277 n.6); '[t]he fact that this is the only case where Thucydides refers to an award bespeaks some exceptional prize. The assignment involved unusual peril and merited unusual recompense'. (Gomme had sought to brush aside what follows in the sentence, where Brasidas actually dedicates the sum to Athena, but Thuc. does refer there to 'the' thirty minas.)

(ii) After his capture of Motya in 397, Dionysius I 'rewarded Archylus, who had been the first to climb up onto the wall, with a hundred minas, and honoured in accordance with their merit each of the others who had been brave' (Diod.Sic. 14.53.4, where ἐστεφάνωσεν might or might not also imply a crown; see generally LSJ s.v., II.2). Unclear there is whether these incentives had been promised in advance.

(iii) At the Sogdian Rock in 327, Alexander the Great did make advance promises on this matter, though the detail of them varies between two of the accounts (see HCA 2.128–129). Curtius Rufus 7.11.12 has a sliding scale of rewards, from 10 talents for the first man to reach the summit to one talent for the tenth man. Arr. *Anab.* 4.18.7 gives a more loosely-phrased tariff: 'the first to climb up should have a prize of twelve (*sic*) talents, the second the rewards for second place, and the third, and so on until lastly the last to get up should have three hundred darics [i.e. 1 talent] as his prize'. Whichever version is correct (if either), the top prize was a small fortune; one would doubt whether τὰ καλῶς ἔχοντα χρήματα of the age of Ph. came close to matching it.

Hellenistic-period evidence is scarcer, but see e.g. Plb. 5.60.3 on Antiochus III at Seleukeia Pieria in 219: he announces 'large rewards and crowns for bravery' (δωρεὰς μεγάλας καὶ στεφάνους ἐπ' ἀνδραγαθίᾳ) both for the rank-and-file troops and for their officers.



On Ph.'s recommendation for crowning troops on the *defenders'* side see C46 [*94.24–26*].

D9.5–7 [*97.13–15*] **κατὰ τοὺς ἀσθενεστάτους τόπους ἀπὸ κλιμάκων καὶ προστιθεμένων δοκίδων τὴν πρώτην ποιῆσαι προσβολήν** ('make the first assault at the weakest spots from (the use) of ladders and screens being brought forward'). For ladders see generally A12 under **ἵνα αἱ**; for 'screens', A22 under **καταγνύωσι**.

The passage is echoed, without these details, in *Par:Pol.* 204.13–15 (4.10–11): τὴν δὲ προσβολὴν πρὸς τὰ σαθρότερα τῶν τειχῶν … ποιεῖσθαι (**Appendix 3** passage no.2).

D9.7–8 [*97.15–16*] **καταφόβων ὄντων ἔτι τῶν ἔνδον καὶ ἀπείρων πολιορκίας** ('while those inside are still fearful and lacking experience of a siege'). Schoene retained the repetitious paradosis here, καταφόβων ὄντων ἔτι τῶν ὄντων, but nobody else has found it tolerable; ἔνδον is Diels's emendation, printed in Diels-Schramm 67 and Garlan 316 (and accepted also, evidently, by Lawrence 101). Alternatives are ἐναντίων or ἐνόντων (Haase ap. Schoene), ὄχλων (Buecheler ap. Schoene).

In Polybius and elsewhere, the adjective κατάφοβος commonly takes an accusative of what is occasioning the fear, but for its use absolutely, as here, cf. e.g. Septuagint *Proverbs* 29.16; Plut. *Pelop.* 31.4.

Diod.Sic. 13.55.1 describes the men of Selinous in 409 as 'for a long time lacking experience of a siege' (ἐκ πολλῶν ὄντες ἄπειροι πολιορκίας), so that facing their former allies the Carthaginians filled them with dread.

D9.9–11 [*97.17–19*] **ἢ διαγνῷς τὸ πλῆθος τῶν μαχομένων ἢ τὰς ψυχὰς αὐτῶν πῶς τε διάκεινται πρὸς τοὺς κινδύνους** ('or (at least) discern the number of fighting men or their state of mind and how they are disposed toward combat'). Though Ph. describes both of these matters as alternative *objectives* of an attack, they might in reality represent knowledge that could be gleaned, as a sort of consolation prize, from an unsuccessful one.

For 'their state of mind' (in circumstances of military danger) cf. e.g. Xen. *Ages.* 2.8, on that Spartan king's attention to the morale of his men: ἐνέπλησε δὲ καὶ φρονήματος τὰς ψυχὰς αὐτῶν, ὡς ἱκανοὶ εἶεν πρὸς οὕστινας δέοι μάχεσθαι.

D10.2–4 [*97.20–22*] **ἔπαλξιν ἐπὶ τοῦ χάρακος θέμενος καὶ τάφρον περὶ τὸ στρατόπεδον περιβαλόμενος διπλῆν** ('furnish the palisade with a parapet and surround the camp with a double trench'). The camp and its encircling palisade have been introduced in D6.2–4 [*96.43–45*] but further strengthening of it comes now, i.e. after any initial assault has failed (Ταῦτα δὲ ποιήσας ἂν μή σοι προσέχωσιν: D10.1–2 [*97.19–20*]) and a longer haul lies ahead. Ph.'s insistence on strongly fortified camps is evident again at D88–89 [*103.19–28*]. See also Plb. 5.20.4–5 (omitting to protect one's camp with a *taphros* and *charax* is to act ἀπείρως ἅμα καὶ ῥᾳθύμως); and compare generally Onas. 8.1 and (in a besieging context) 40.2.

Plb. 6.42.2–5 juxtaposes the Greek and Roman approaches – to the detriment of the former – toward establishing a fortified camp. His fellow-Greeks, he claims,

shirk the effort of entrenching and seek instead to exploit the natural features of the location; the Romans, embracing that and other aspects of the labour involved, produce a uniform and intelligible design. As Garlan 394 n.10*a* comments, the contrast is overdrawn as the generalisation it is, and where Ph. is concerned there is no call to suppose that he is invoking Roman practice here; rather, there is ample evidence from his own world that such camps, including those established by besiegers, were routinely well fortified. The relevant historiographical testimony, from Herodotus to Polybius, is surveyed in Pritchett, *War* 2.133–146, with special reference to the terminology used. See also J.R. McCredie, *Fortified Military Camps in Attica* (*Hesperia* suppl.11, 1966); H. Lauter, 'Some remarks on fortified settlements in the Attic countryside', in van de Maele and Fossey (ed.), *Fortificationes Antiquae* 77–89; and generally the Macedonian army regulations from Amphipolis (ISE 114: C28 under **<ἐν> αἷς**), block A col.2.

D10.4–6 [*97.22–24*] **τά τε μηχανήματα ἵστα ὑπότροχα καὶ περίακτα κατασκευάζειν** ('set up machines with wheels underneath and make (them) rotating'). After μηχανήματα Schoene retained the transmitted εἰς τὰ ὑπουρουχέα, while voicing a suspicion that εἰς τά concealed an imperative. His successors adopt the one suggested by Buecheler ('ἵστη vel potius ἵστα'), and also accept ὑπότροχα (already at A80.1 [*85.39*], and cf. ὑπότροχοι at D40.2 [*99.45*]) from Rochas d'Aiglun.

For περίακτα cf. already τοῖς περιάκτοις τροχοῖς at C13.1–3 [*91.43–45*], there referring to water-wheels which can release or propel sea-water onto enemy *stoai*. The present passage, clearly, concerns different kinds of wheels altogether, though again they are described by this adjective, which appears to concern the capacity of these 'machines' to be steerable ('drehbar', Diels-Schramm 68; 'munies de roues et d'un système de direction', Garlan 317). Compare ἀντίστρεπτα in what Diod.Sic. 20.91.3 writes about the helepolis deployed by Demetrius Poliorcetes against Rhodes: Πρὸς δὲ τὴν ἐκ πλαγίας μετάθεσιν ἦσαν ἀντίστρεπτα πεπραγματευμένα, δι' ὧν ἡ πᾶσα μηχανὴ ῥᾳδίως παντοίαν ὑπελάμβανε κίνησιν. And the vocabulary is different again in the passage of Athenaeus Mechanicus which derives directly from what Ph. says here (15.13–18.7: see **Appendix 2**). There the axle-blocks are called 'wagonfeet', ἁμαξίποδες, a term Athenaeus repeats in the course of his elaborate description of Hegetor's fantastical ram-tortoise (21.1–26.5, at 22.2: its eight wheels στρέφονται … ἐν ἁμαξίποσιν). The two corresponding passages in Vitruvius, 10.14.1 and 10.15.3 respectively, use equivalent Latin vocabulary, in particular in this regard the colourful term *arbusculae* (elsewhere applied to a shrub, or a peacock's crest: Whitehead and Blyth, *Athenaeus* 111 n.25), which 10.14.1 expressly declares to be the same as Greek ἁμαξόποδες (sic).

Vocabulary aside, to visualize in substantive terms exactly what is being described here has proved difficult; cf. Whitehead and Blyth, *Athenaeus* 112, with bibliography. Garlan 231 fig.13 reproduces, as have others, the elegant sketch from Auguste Choisy's edition of Vitruvius (Paris 1909) which depicts a simple castor able to pivot through 360° on a vertical axle. However, besides being deemed a dangerously fragile contrivance it does not make a good match with what either Athenaeus or Vitruvius describe, particularly the former's statement that, when nec-

essary, the wheels are removed to enable their orientation to be changed. In any case, it is in connection, precisely, with the ἀμαξίποδες/*arbusculae* that a significant discrepancy between the two versions arises; for whereas in Athenaeus the possible changes of direction are restricted to 90°, Vitruvius claims the possibility of oblique movements also. (Garlan 230 figs.11–12 reproduces Sackur's drawings of what each system might have looked like [W. Sackur, *Vitruv und die Poliorketiker* (Berlin 1925) 67–69]; and see also Lendle, *Schildkröten* 9–10 and 18–20.)

There remains the matter of where the (large) nucleus of this material comes from. Whitehead and Blyth, *Athenaeus* 109 roundly declare that '[s]ince Philo does not go on [*sc.* in D10] to describe how to *build* a filler tortoise, as both Ath. and Vitr. do, one may take it that Ath.'s reliance on Philo ends at 16.3 [καὶ ἐάν τινα ἄλλον τόπον δέῃ χῶσαι] and that no source for 16.3 ff. is identifiable beyond its immediate one: Agesistratus'. Yet if that view is not demonstrably wrong, it is vulnerable to the charge of ignoring the heavily epitomized state in which Ph. has been transmitted. Athenaeus and Vitruvius did share an immediate source in the shape of Agesistratus – Vitruvius seemingly elaborating him in this instance – but there must be a fair chance that all this material goes back, through Agesistratus, to Ph.

D10.6–7 [*97.24–25*] **φοινικίνας σανίδας ἔχοντα, ἵνα μὴ συντρίβωνται** ('fitted with date-palm planks, in order that they are not crushed'). See B1 under **καὶ φοινικικούς** and C3 under **ἰσχυραί**.

More ways of protecting tortoises will be suggested in D51 [*100.25–32*].

D10.7–9 [*97.25–27*] **καὶ τὰς στοὰς οἰκοδομεῖν καὶ τοὺς ἐπιτηδείους τόπους ὑπορύττειν, ἐὰν μὴ ὕπομβρος ᾖ ὁ τόπος** ('also (it is necessary) to build stoas and to undermine suitable sites – unless the site is subject to inundation'). On stoas see A50 under **τὰς προσῳκοδομημένας**; on undermining, A1 under **μηδ' ὑπορύττηται**; and cf. A36.1–2 [*82.28–29*] for the proviso about dry ground (in that context, on digging defensive trenches).

Garlan 395 n.10*c* comments that Ph.'s link here between deploying stoas and digging mines is often to be seen in the siege-narratives themselves. The instance he gives is Plb. 21.28.4–5 (the Romans at Ambrakia); add e.g. Plb. 9.41.1–7 (Philip V at Echinos).

D10.9–12 [*97.27–30*] **ἢ χελώνας κατασκευσάμενος χωστρίδας τὰς τάφρους χώννυε τὴν χώραν μὴ φθείρων· ὕστερον γάρ, ἐὰν συμφέρῃ, τοῦτο ἔσται σοι ποιῆσαι** ('or to prepare filler tortoises and fill the (enemy) trenches without ruining the terrain, for that is something you will be able to do later, should it be expedient.'). For echos – though not of the point about sparing the *chôra* – and elaborations in *Par.Pol.* 209.3–212.10 (11.1–29), see **Appendix 3** passage no.4.

This is Ph.'s first explicit mention of filler tortoises, χελῶναι χωστρίδες, but see above under **τά τε μηχανήματα** (and A73 under **οὔτε**). More will come in D11 [*97.30–34*], D39 [*99.41–44*], and D56 [*100.44–46*]. See generally Whitehead and Blyth, *Athenaeus* 108–118.

Circumstances in which Ph. does advocate harsh treatment of the defenders' *chôra* are outlined at D86–87 [*103.12–19*].

ÉCOLE FRANÇAISE BIBLIOTHÈQUE D'ATHÈNES

D11.1–5 [*97.30–34*] **Ἐὰν δὲ μὴ δύνῃ χῶσαι διὰ τὸ βαθείας καὶ εὐρείας εἶναι, χελώνην δεῖ προθέμενον χωστρίδα σχεδίαν ζευγνύοντα προσαγαγεῖν οὗ βούλεται τοὺς στρατιώτας** ('If you are unable to fill (the trenches) because of their being deep and broad, it is necessary to apply a filler tortoise yoked with a "raft" for conveying the soldiers where wanted'). For echos in *Par.Pol.* 259.1–13 (47.1–14) and 260.5–261.2 (48.1–13), see, respectively, **Appendix 3** passages nos.6 and – credited to Ph. by name – 7. The second passage there repeats Ph.'s applied use of the term *schedia*, raft or float. Here in Ph. himself, previous translators have rendered σχεδία as 'Brücke' (Diels-Schramm 68), 'passerelle' (Garlan 317) and 'gangway' (Lawrence 101); however, it is in the earlier *Par.Pol.* passage where trenches that are 'broad or deep' can be negotiated by means of a *diabathra* (see C14 under **Πρὸς δέ**) attached to the front of a filler tortoise.

Compare generally Front. *Strat.* 3.9.9: Pericles, at an unidentifiable *Peloponnesiorum castellum*, conveys troops across a *fossa* (of his own making) on *pontes*; cf. already 1.5.10 (and Polyaen. 5.10.3: apparently the same episode but attributed to Himilco the Carthaginian, late fifth/early fourth century, at a city in Libya).

D12–16 [97.34–98.4]: proclamations for psychological advantage

D12.1–2 [*97.34–35*] **Ποιοῦ δὲ καὶ κηρύγματα τῶν πολεμίων ἀκουόντων τοιαῦτα** ('Make proclamations too, in the enemies' hearing, such as these'). A proclamation made 'in the enemies' hearing' can sometimes be one intended to deceive them, as in Xen. *Anab.* 3.4.36 (and see also Polyaen. 2.18, 5.33.2), but evidently not here. Other instances of face-value proclamations to an enemy are noted under the lemmata below.

The examples which now follow make up the first of a sequence of passages where Ph. counsels his attackers to spend money astutely, so exemplifying one manifestation of King Archidamus's celebrated dictum in Thuc. 1.83.2 (ἔστιν ὁ πόλεμος οὐχ ὅπλων τὸ πλέον ἀλλὰ δαπάνης, δι' ὧν τὰ ὅπλα ὠφελεῖ; cf., *mutatis mutandis*, Philip II's in Diod.Sic. 16.53.3, διὰ χρυσίου πολὺ μᾶλλον ἢ διὰ τῶν ὅπλων ηὐξηκέναι τὴν ἰδίαν βασιλείαν). See also D65 [*101.28–30*] and D76–83 [*102.27–103.3*]; cf. Chaniotis, 'Greeks under siege' 441.

D12.2–4 [*97.35–37*] **<τοῖς μηνύσασιν> ὁπλίσεις τε σιδήρων ὑπορυκτικῶν καὶ μηχανημάτων στάσεις καὶ τὰ τούτοις ἀκόλουθα** ('<to those who have provided information about> (?)stockpiles of iron tools for undermining and locations of machines and similar things'). This clause and the ones which follow in D12.4–8 [*97.37–41*] all depend on τιμήσειν καὶ χρήματα δώσειν at the end of the sentence, and I take them to be verbatim versions of the proclamations concerned; D13 [*97.41–45*], with ἄν, then turns to summary mode.

The beginning of this first one is textually most uncertain. Garlan 317 (with comment at 395 n.12*a*) reluctantly – 'faute de mieux' – accepts the reconstruction of Diels, as printed in Diels-Schramm 68. I concur, albeit with an equal lack of conviction. Though the initial <τοῖς μηνύσασιν> is pure supplement, such a phrase

seems required by the syntax of τιμήσειν κτλ (see above), especially if the transmitted ὅπως εἰς which immediately follows it becomes the accusative plural ὁπλίσεις. The sense of that noun here does have to be something like 'stockpiles' ('die Ausrüstung', Diels-Schramm; 'des dépôts', Garlan), even though attested senses elsewhere are less concrete. If I had to offer a textual alternative, it would probably be to take θέσεις from the phrase suggested by Buecheler ap. Schoene, ὅπως θέσεις τε εἰδῇς τῶν (or <πό>ρων), and create something like ὅπου θέσεις ὦσι. For θέσεις in such a sense, at any rate, cf. e. g. Plb. 3.58.2, θέσεις τῶν περὶ τὰς ἐσχατιὰς τόπων. (Thankfully, the genitive plural phrase dependent on this accusative plural is less problematic. Though its adjective, ὑπορυκτικός, is a *hapax legomenon*, its meaning is clear enough; and for noun-less σίδηρα as iron tools or implements see generally LSJ s. v. σίδηρος, II.)

In the phrase μηχανημάτων στάσεις the 'machines' in question need not be restricted in their scope to mobile towers.

D12.4–6 [*97.37–39*] **καὶ ἐὰν ἀποκτείνας τις ἢ τῶν μηχανοποιῶν τινὰς ἢ τῶν ὄντων ἐπὶ τῶν βελῶν ἀξιολόγων** ('and if anyone after killing some of the engineers or those who are noteworthy in respect of artillery'). On this terminology see generally B49 under **μηχανοποιόν**.

Since ἀποκτείνας is a participle, it is necessary to include this clause (as well the one immediately following it) within the scope of 'comes to us': see the next lemma.

D12.6–8 [*97.39–41*] **ἢ <ἐάν τις> τῶν ἐνδόξων ἐναντιουμένων τοῖς πράγμασι παραγίνηται πρὸς αὐτούς** ('or <if any> of the leading men opposed to the status quo comes to us'). As transmitted, ἢ τῶν ἐνδόξων κτλ is a third genitive-plural element (for the first and second see the preceding lemma) dependent upon 'if anyone after killing'. However, Schoene already indicated concern about this paradosis through his tentative suggestion τῶν ἐνδόξων <τις>, and Diels's <ἐάν τις> τῶν ἐνδόξων is printed in Diels-Schramm 68 and accepted by Garlan 317. The latter's accompanying note calls attention to a possible reason for retaining the paradosis – by regarding 'les πράγματα dont il est question sont les intérêts, non des chefs adverses, mais des assiègeants eux-mêmes' (Garlan 395 n.12*b*); however, I agree with him that D83 [*102.50–103.3*], on incriminating letters to be sent to prominent individuals inside the city, provides good support for the supplement.

D13.1–5 [*97.41–45*] **καὶ τὸν μὲν δοῦλον ἐλεύθερον ἂν ἀφεῖναι, τὸν δὲ στρατιώτην ἀναβιβάσειν, τὸν δὲ ὁπλίτην μέτοικον στεφανώσειν, καὶ δώσειν δωρεὰς τὰς κατ' ἀξίαν τοῦ πραχθέντος ἔργου** ('and (you) would (promise) to free a slave, promote a soldier, crown a metic hoplite, and give rewards worthy of the action performed'). The manuscripts have ἀναφῆναι as the first infinitive here; Schoene's ἂν ἀφεῖναι, accepted by all, indicates that the presentation of these specimen proclamations is now in indirect speech. By contrast, nobody has followed the proposals of Brinkmann and Buecheler ap. Schoene to remodel the transmitted τὸν δὲ ὁπλίτην μέτοικον στεφανώσειν. In Brinkmann's version it becomes τὸν δὲ μέτοικον πολίτην <ποιήσειν καὶ> στεφανώσειν ('to make a metic a citizen and crown him'), on the general analogy of App. *Mithr.* 189–190 (Mithradates VI's moves to curry favour with various cities of Asia Minor and their populations in 86; they include τοὺς ἐν ἑκάστῃ μετοίκους πολίτας αὐτῶν ἐποίει). Buecheler's modifications produce τὸν δὲ μέτοικον πολίτην ἂν ἀποφῆναι, τὸν δὲ στρατιώτην ἀναβιβάσειν <καὶ> στεφανώσειν.

The phraseology here – the three singulars, in conjunction with the final clause (which is applicable, evidently, to all three categories of person mentioned) – makes it clear that Ph. is suggesting incentives for *individual* deserters; men who, above and beyond the desertion itself, are deemed to have done the attackers some service; cf. Garlan 395 n.13*a*, and compare generally Onas. 10.15. (Mass, blanket emancipation is exemplified at Morgantina in 104 (Diod.Sic. 36.4.8): Salvius (Tryphon) 'made a proclamation granting the slaves in the city their freedom, but when their masters made the same offer to them if they would join in the fight, they chose their masters' side, fought zealously, and repelled the siege'.)

For promoting (mercenary) troops see C46 under **ὅσοι**. In the present passage the 'rewards', additional to what is stated in each case, are likely to be monetary; certainly so as regards the mercenaries (note e. g. Diod.Sic. 20.75.1: Ptolemy in 319 announces, as cash payments for those who will desert Antigonus, two minas for the rank-and-file and a talent for officers), and probably for the other groups too. On the slaves and metics – whom the besieged city may or may not have decided to enlist at this stage – see C31 under **οἵ τε παῖδες**. (As regards the metics, I would challenge the claim of Garlan 396 n.13*b* that Ph.'s suggestion here shows them to be 'plus enclins …à la trahison' than the citizens.)

See further under the next lemma.

D14.1–5 [*97.45–49*] **Τὰ γὰρ τοιαῦτα κηρύγματα μάλιστά πως εἴωθε τῶν ἐναντίων τὰς διανοίας <ταράττειν> καὶ τοὺς μετοίκους καὶ τοὺς οἰκέτας ποιεῖν μηκέθ' ὁπλίζειν καὶ διδόναι τὰ καλῶς ἔχοντα ἐπιτήδεια** ('Proclamations of this kind are particularly likely, somehow, <to disturb> the minds of the opponents and make them no longer arm the metics and the slaves and give (them) the well-established rations'). Schoene marked a lacuna after διανοίας, confining to his apparatus his suggestion for filling it, but his <ταράττειν> is printed in both Diels-Schramm 69 and Garlan 317. Certainly either that or a similar verb is needed. The phrase τῶν ἐναντίων τὰς διανοίας invites comparison with (τὸ πλῆθος τῶν μαχομένων καὶ) τὰς ψυχὰς αὐτῶν in D9.9–10 [*97.17–18*].

On the besieged city's metics and slaves see under the preceding lemma. Ph's form of words here, μηκέθ' ὁπλίζειν, appears to suggest that the attackers are to try to reverse a policy (of enlisting them) that is already in place. Be that as it may, to deduce from what is said here that '[l]es métèques ne paraissent … pas avoir servi en temps ordinaire' (Garlan 396 n.14*a*) seems to me unwarranted; nor do I see any substantive significance (as does Garlan 396 n.14*b*) in the fact that Ph.'s term for slaves changes here from *douloi* to *oiketai*.

On 'well-established' rations see D9 under **ἐπικηρύξας**.

D15.2–4 [*97.50–98.1*] **ἐλάττους οἱ κινδυνεύοντες ἔσονται καὶ πλείονα σῖτα ἀναλώσουσιν καὶ τάχα στάσις τις ἔσται ἐν τῇ πόλει** ('the combatants will be fewer and they will consume more provisions (than others) and swiftly there will be

some sedition in the city'). My supplement to the translation is intended to make explicit something that Ph. himself does not. The combatants, if restricted to citizens, will of course eat less, not more, in absolute terms than before, but ill-feeling may arise if they are seen to be eating relatively more than the civilian population; cf. Garlan 396 n.14*c*, citing the case of Alcibiades' siege of Byzantium (in Xen. *Hell.* 1.3.19, echoed by Plut. *Alc.* 31.6).

This is the only instance in Ph. of στάσις *in this sense*. (There are two instances of a neutral one: A37.7 [*82.38*] and D12.3 [*97.36*].)

Compare generally Diod.Sic. 20.84.2 on Rhodes when faced by Demetrius Poliorcetes in 305 (cf. A86 under **Δεῖ δὲ καί**): those *paroikoi* and *xenoi* who were unfit (and unwilling) to fight were sent out of the city, which combined a policy to conserve food with a precaution against treachery (ἅμα μὲν τῆς τῶν ἀναγκαίων ἐνδείας προνοηθέντες, ἅμα δὲ καὶ τοῦ μηδένα τῇ καταστάσει δυσχεραίνοντα γίνεσθαι τῆς πόλεως προδότην).

D16.1–4 [*98.1–4*] **Τοὺς δ' ἀχρείους ὄντας ἐὰν παραγίνωνται, μὴ προσδέχου, ἵνα τροφὴ τῶν πολιορκουμένων θᾶττον ἀναλίσκηται** ('If those who are of no use come to you, do not accept them, in order that the food of the besieged will be consumed sooner'). The manuscripts have ἔλαττον ἀναλίσκηται, i. e. the exact opposite of the intended effect; the standard emendation to θᾶττον (Buecheler ap. Schoene) must be right, even if it did not have a parallel in Onas. 42.23: 'should (the general) give up on a sack by force and settle down to a lengthy siege, thinking to take the city by pressure of hunger, he should take prisoner whatever persons are still in the territory; of these […], women and children and feeble people and the old he should send of his own accord into the city; they will be useless for activities but will, together, consume more quickly the foods (τὰς …τροφὰς θᾶττον συναναλώσει) prepared for those inside – which will be more like having enemies than friends'.

Perhaps the prime exemplar of Ph.'s recommendation in action is Lysander *vis-à-vis* Athens in 405: 'both the Athenians' garrison-troops (in Byzantium and elsewhere) and any other Athenian he saw anywhere he sent back to Athens, granting them safe passage to sail only there but nowhere else; he knew that the more people congregated into the town and Peiraieus, the sooner there would be a shortage of essentials' (θᾶττον τῶν ἐπιτηδείων ἔνδειαν ἔσεσθαι: Xen. *Hell.* 2.2.2, cf. Plut. *Lys.* 13.3). But other blockades involve episodes of the same kind; here are three. Preparing to besiege 'Leucadia' (Leucas) in the 260s, Alexander of Epirus first captured outlying *castella* and allowed all their inhabitants to take refuge in the city, 'in order that the food-supplies, shared amongst many, would be more quickly consumed' (*ut alimenta inter multos celerius absumeretur*: Front. *Strat.* 3.4.5). During the siege of Jerusalem in 134 by Antiochus VII Sidetes, concerns about the rate of food-consumption (ἀναλισκομένων …τῶν ἐπιτηδείων τάχιον) at first led John Hyrcanus to expel τὸ ἀχρεῖον from the city, before the celebration of the festival of Tabernacles (Sukkot) brought about a change of heart: Joseph. *AJ* 13.240. (Ultimately the food did run out, and Hyrcanus negotiated a truce with Antiochus.) And at Alesia in 52 the Gallic defenders aimed to conserve food supplies by expelling the old and infirm (*ei qui valetudine aut aetate inutiles sunt bello*) from the town – and those concerned failed to find refuge with the Romans either: Caes. *BG* 7.77–78. Note generally Veget. 4.7: 'those unfit for fighting by reason of age and gender were often shut out of the gates because of the need to conserve food, lest hunger oppressed the soldiers who were protecting the walls'.

D17–20 [98.4–24]: initial positions

D17.2–4 [*98.5–7*] **ὁδοποιήσας καὶ φαλαγγώσας τὰς προσαγωγὰς τοῖς μηχανήμασι τὴν ταχίστην αὐτὰ πειρῶ προσάγειν** ('make pathways and roll (flat) the approach-routes for the machines and try to deploy them as quickly as possible'). The first of these verbs has already appeared at C64.1–2 [*95.36–37*], Ἐπειδὰν δὲ τῷ προσαγομένῳ μηχανήματι ὁδοποιηθῇ, and is unproblematical *per se*. The second, very much rarer, is defined by LSJ s. v. as 'furnish with rollers', and two passages are cited in support of that meaning: the present one and Polyaen. 5.2.6, where the troops of Dionysius I at Motya in 397 convey a fleet of triremes across a twenty-stade mudflat by covering it with wooden rollers, ξύλοις φαλαγγώσαντες. Both Diels-Schramm 69 ('beschaffe Walzen zum möglichst schnellen Vorbringen der Maschinen') and Lawrence 101 ('put rollers to bring mobile towers forward as quickly as possible') envisage the same procedure here; by contrast Garlan 317–318 has 'passe au rouleau les chemins d'approche des ouvrages de charpente, et efforce-toi d'approcher ceux-ci le plus vite possible'. I have followed Garlan, on the assumption (not stated by him) that Ph.'s *mêchanêmata* are wheeled and thus need simply a flat or flattened surface to move across. Compare generally Plb. 9.41.4 (Echinos, 211): οἵ τε προχωννύντες τὰς ἀνωμαλίας τῶν τόπων ἐπὶ τῇ τῶν ἐσχαρίων ἐφόδῳ τὴν γῆν ἐπέβαλλον.

D17.4–6 [*98.7–9*] **φράξας ταῖς φοινικίναις σανίσι καὶ σιδηραῖς λεπίσι καὶ μαλάγμασι** ('having strengthened them with date-palm planks and iron plates and paddings'). On the first of these items cf. C3 at **τὰς ἐκ τῶν** and D10.6–7 [*97.24–25*]; on the third, C3 under **ἔπειτα**.

Iron plates are mentioned only here, as transmitted. However, at D34.3 [*99.23*] (in a section on protecting 'machines' and other equipment against fire) the paradosis ταῖς σιδηραῖς καὶ χαλκαῖς χρηστέον ἐστί, though printed by Schoene, was supplemented with <λεπίσι> by Brinkmann ap. Schoene. This is now orthodox (Diels-Schramm 72, Garlan 319, Lawrence 102–103), though see the Comm. thereto.

Diod.Sic 20.91.3 records the same feature on Demetrius Poliorcetes's helepolis at Rhodes; cf. also Athen.Mech. 17.2, 22.1, 34.5, 35.5–36.1; Apollod.Mech. 152.12 and (in interpolated material) 176.17–177.1, 177.4–5, 181.13–14.

D17.6–7 [*98.9–10*] **χολέδραις ἄνωθεν κατασκευάσας** ('having provided them with (?)gutters at the top'). The noun, very rare, is used in the sense of 'groove' in a commentary on Archimedes (Eutocius, *Comm. de sph. et cyl.* 94.1–2), and as 'gutter, drain-pipe' (so LSJ s. v.) in the present passage and two others: Apollod.Mech. 182.7 (interpolated: a ladder-borne device for conveying heated fluids has a long semicircular channel gouged out of it 'like a *choledra* in shape', χολέδρᾳ τὸ σχῆμα ὅμοιος) and ?Horapollo, *Hieroglyphica* 1.21 (τὰς χολέδρας καὶ τοὺς εἰσαγωγεῖς τῶν

ἱερῶν κρηνῶν of the Nile). Here in Ph. Diels-Schramm 69 translate the term as 'Rinne' and Lawrence 101 as 'water-containers', both without comment. Garlan 318 has 'tuyaux', with a note adducing Plb. 9.41.5 (on the second storey of the tortoise-borne towers deployed by Philip V at Echinos (cf. above under **ὀδοποιήσας**) 'water-jars and the appliances for (putting out) fires', ὑδρίας καὶ τὰς πρὸς τοὺς ἐμπυρισμοὺς … παρασκευάς) and, more fully, *Par.Pol.* 247.6–15 (39.19–30 Sullivan). This latter is in fact the Byzantine writer's version of Apollod.Mech. 174.1–7 (interpolated, but pre-*Par.Pol.*): 'For the forward parts (of the tower vulnerable) to incendiaries, also, (provide) intestines of oxen serving as pipes, carrying water to the top; skins full of water are attached to these and, when compressed, carry it up. And if an inaccessible extremity catches fire anywhere, and an implement called a pump is not there, re-bored reeds are fitted together, just like those of the birdcatchers, where they are needed to take water, and full skins are pressed to squeeze water through them onto the place that is burning' (Κατὰ δὲ τὰ προκείμενα τοῖς πυροβόλοις μέρη καὶ ἀντὶ σωλήνων βοῶν ἔντερα παραφέροντα ὕδωρ εἰς ὕψος τούτοις ἀσκοὶ πλήρεις ὕδατος παρατίθενται καὶ θλιβόμενοι ἀναφέρουσι. Κἂν που ἀκρωτήριον καίηται δυσεπίβατον, μὴ ᾖ δὲ ὄργανον ὃ καλεῖται σίφων, κάλαμοι πάλιν τετρημένοι ὥσπερ οἱ τῶν ἰξευτῶν ἁρμόζονται ὅπου δεῖ φέρειν αὐτοὺς ὕδωρ, ἀσκοί τε πλήρεις πιεζόμενοι ἐκθλίβουσι δι' αὐτῶν ἐπὶ τὸν καιόμενον τόπον). As can be seen, there is no overlap of vocabulary between this material and the present passage of Ph.; nevertheless his *choledrai* do seem to be something one should visualize as a (or part of a) fire-fighting feature. My tentative translation of the word as 'gutters' is not intended to exclude the possibility that they might be fully enclosed.

D17.7–8 [*98.10–11*] **τοὺς πετροβόλους καὶ τοὺς ὀξυβελεῖς ἐπιστήσας** ('position the rock-projectors and the bolt-firers'). On the face of it, Ph. has forgotten that he has said this already, at D9.2 [*97.10*]: τότε τὰ βέλη ἐπιστήσας πάντα. But see further under the next lemma.

D17.8–10 [*98.11–13*] **πρὸς τοὺς ἐκείνων λιθοβόλους δύο δεκαμναίους πρὸς ἕκαστον καὶ πενταςπίθαμον ἀντιστήσας** ('against each of the enemy's' stone-projectors counter-position two ten-mina (4.37 kg.) (ones) and a five-span (1.155 m.) (bolt-firer).'). See C6 under **Ἀνθιστάναι** for counter-positioning artillery, and also on ten-mina lithoboloi. A five-span bolt-firer is a calibre Ph. does not otherwise recommend, and indeed it is unmentioned in literary sources altogether; but archaeologically-reconstructible ones are known from Ephyra and Sounion (see Rihll, *Catapult* 292).

Garlan 396 n.17*c* reasonably characterizes both the *dekamnaios* and the *pentaspithamos* as 'pièces légères, comme on peut en attendre à l'intérieur d'un ouvrage de charpente'. In point of fact Ph. does not spell out that that is how they are to be deployed, but he certainly implies it, and all the more so if one disregards the immediately preceding clause and links this one with what D17.3–7 [*98.6–10*] has said about the construction and features of these towers. I find here another reason (cf. the preceding lemma) for wondering whether D17.7–8 might be an intrusion into the text.

D18.1–4 [*98.13–16*] **Μὴ φανερὸς δὲ γίνου καθ' ὃ ποιήσῃ τὴν προσαγωγήν, ἀλλὰ κατ' ἄλλους μὲν προδείκνυε τόπους, κατ' ἄλλους δὲ πρόσαγε τὰ μηχανήματα** ('Do not make it obvious where you will make the attack; rather, feint in some places and deploy the machines in others'). For the echo in *Par.Pol.* 204.10–13 (4.7–9) see **Appendix 3** passage no.2.

The verb προδεικνύω in this sense and context is used by Onas. 42.6: 'just like a good wrestler, (the general) must προδεικνύειν and σκιάζειν at many points, diverting and deceiving here and there at many places'. See also Xen. *Hipp.* 8.24 (again intransitive) and Plb. 2.66.2 (Antigonus Doson προδεικνύων τινὰς ἐπιβολάς).

D19.2–3 [*98.18–19*] **προφερέσθωσαν γερροχελῶναι ὡς πλεῖσται** ('let wicker-tortoises be advanced, as many as possible'). The first authentic appearance of this term in the treatise (at C68.5 [*96.6*] it is interpolated; see the Comm. thereto). More detail is provided at D36–37 [*99.29–37*], and see also D43.1–3 [*100.2–4*].

D19.3–4 [*98.19–20*] **ἵν' εὐχερῶς ἐντεῦθεν ἐκπηδῶντες κινδυνεύσωσιν** ('in order that they may readily leap out from there and engage in combat'). For the verb ἐκπηδᾶν in contexts like this cf. e.g. Xen. *Anab.* 7.4.16, Hell. Oxy. 21.2, Diod.Sic. 13.17.4, App. *Iber.* 20.

D20.1–5 [*98.20–24*] **Αὐτὸς δὲ μάλιστα ἐν τοῖς ἀσφαλεστάτοις ἐρύμασιν ὢν καὶ μάλιστα εὐλαβοῦ παραβοηθεῖν, προστάσσων ἐάν που [δέος] δέῃ καὶ συνθεωρῶν, ἔτι τί ποιητέον ἐστίν** ('You yourself, especially, must be in the safest strongholds and must take special care to send out help, issuing orders as and when it is necessary and taking an overview (to see whether) something more needs to be done'). The textual adjustments here, including συνθεωρῶν (on which see below) for the transmitted συνθεωρεῖν, are those of Diels, printed in Diels-Schramm 70 and Garlan 318. (Schoene had accepted most of the paradosis: προστάσσων ἐάν που δέον. δεῖ δὲ καὶ συνθεωρεῖν κτλ. And note also the suggestion of Buecheler ap. Schoene: ἐὰν δέῃ σπουδῇ καὶ συνθεωρεῖν.)

The doctrine that the commander should stay out of personal danger, instead orchestrating the fight from a position of elevated oversight, reappears at D28 [*99.3–6*] and D68–69 [*101.37–42*]. It was not original to Ph. but can be traced back to the late fifth century (cf. Garlan 396 n.20*a*), where such advice was given to the Cyrus the Younger (Xen. *Anab.* 1.7.9, cf. Plut. *Artax.* 8.2, Polyaen. 2.2.3). See also e.g. Plb. 10.3.7, 10.13.1–5, 10.24.2–5, 10.32.7–33.7, 10.41.2, 11.2.9–11; Plut. *Pelop.* 1–2, *Philop.* 7.9 (cf. Polyaen. 6.4.1); Onas. 33; and generally E.L. Wheeler, 'The general as hoplite', in V.D. Hanson (ed.), *Hoplites: the classical Greek battle experience* (London & New York 1991) 121–170, esp. 152–153. In later military literature see e.g. *Sylloge tacticorum* 4.1–2.

For Ph.'s προστάσσων cf. generally C44.7–8 [*94.19–20*], τὸ προσταττόμενον τῷ στρατηγῷ. The other participle he uses, συνθεωρῶν, is a favourite with Polybius (1.9.3, 2.55.1, 4.70.6, 5.4.2, 5.22.10, 7.17.7; and plural in 1.23.5, 3.11.1).

D21–23 [98.24–34]: when approaching by sea

D21.1–3 [*98.24–26*] **Ὡσαύτως δὲ καὶ ἐκ θαλάσσης ἐὰν <ποίῃ τὴν> προσαγωγήν, ἐπί τε τῶν ὁλκάδων καὶ τῶν λέμβων στήσας μηχανήματα πρόσαγε** ('Similarly, if <you are making the> attack from the sea, attack after putting machines on your cargo-vessels and *lemboi*'). Schoene marked a lacuna after ἐάν; this sensible way of filling it (Brinkmann ap. Schoene) is printed in both Diels-Schramm 70 and Garlan 318.

The context here returns to the one briefly envisaged at D5 [*96.37–41*], and cf. also C51–62 [*94.36–95.32*]. See also D38 [*99.37–40*].

For 'cargo-vessels' (*holkades*) see C55 under **καὶ ἐν ταῖς**; for *lemboi*, C54 under **πλοῖα**. A prime instance of the use of the former for the purpose Ph. recommends here is Diod.Sic. 20.85.1: at Rhodes in 305 Demetrius Poliorcetes 'began to prepare two tortoises, one for the rock-projectors, one for the bolt-firers, both of these mounted on two cargo-carrying vessels and fastened securely; also two four-storey towers, exceeding in their heights the harbour's towers, each of these mounted on two equal vessels and attached in such a way that in the advance the support on each of the sides would bear an equally-balanced weight' (ἤρξατο κατασκευάζειν δύο χελώνας, τὴν μὲν πρὸς τοὺς πετροβόλους, τὴν δὲ πρὸς τοὺς ὀξυβελεῖς, ἀμφοτέρας δε ταύτας ἐπὶ δύο πλοίων φορτηγῶν διαβεβηκυίας καὶ κατεζευγμένας, δύο δὲ πύργους τετραστέγους ὑπερέχοντας τοῖς ὕψεσι τῶν ἐπὶ τοῦ λιμένος πύργων, ἑκάτερον δὲ τούτων ἐπὶ δύο πλοίων ἴσων βεβηκότα καὶ κατειλημμένον ὅπως ἐν τῷ προσάγειν ἡ στάσις ἑκατέρα τῶν πλευρῶν ἰσόρροπον ἔχῃ τὸ βάρος). Further references (of a more general kind) in Garlan 397 n.21*a*

D22.1–5 [*98.27–31*] **διασκάψας ταῖς μεγίσταις σκαφίσι τὸ κλεῖθρον τοῦ λιμένος, ἐὰν ἔχῃς καταφράκτους ναῦς, ποίησαι τὴν προσβολὴν τοῖς ἐμπειροτάτοις οὖσι καὶ δυναμένοις κινδυνεύειν καὶ μάλιστα κατὰ θάλασσαν** ('when you have broken through the barrier of the harbour with your largest vessels, if you possess decked warships, make the assault with the men who have most experience and are especially able to engage in combat by sea'). On this barrier see C52 under **Τὰ δὲ στόματα**; and for διασκάπτειν cf. e.g. Diod.Sic. 14.48.2 (the defenders of offshore Motya do this to their own artificial causeway, in order to deny Dionysius access).

W.M. Murray, *Age of Titans* 296 takes the ἐὰν ἔχῃ καταφράκτους ναῦς clause with what precedes it ('with your largest ships if you have cataphracts'), Diels-Schramm 70 with what follows it ('durchbrich mit den grössten Kähnen die Hafensperre, und wenn Du Panzerschiffe hast, usw'). (Garlan 318 occludes the point.) I follow Diels-Schramm. At all events, on cataphracts – not mentioned by Ph. again – see generally Casson, *Ships* 52–53, 87–88, 123–124, and passim; W.M. Murray, *Age of Titans* 296 n.37 (and Index s.v.).

The men with experience of such assaults (cf. again D103.2–4 [*104.10–12*]) are, in plain terms, marines (cf. W.M. Murray, *Age of Titans* 296 n.38), though the term is not actually used until D105.3 [*104.23*].

D23.1–4 [*98.31–34*] **Τὴν δὲ διάσπασιν τοῦ φράγματος καὶ τῶν κλείθρων ἢ ταῖς ἐμβολαῖς τῶν νηῶν ποιητέον ἐστὶν ἢ ταῖς ἐνάψεσι τῶν ἀγκυρῶν <ὀ>νεύοντα ἐκ**

τῶν προσαχθεισῶν ὁλκάδων ('The breaching of the closure and the barriers is to be done either with the beaks of the ships or with the arms of the anchors, hauling (the latter) up out of the cargo-vessels you have deployed'). In the first phrase here (which, in marginally different terms, picks up D22.1–2 [*98.27–28*]) διάσπασιν is Schoene's emendation, now standard, of the transmitted διάστασιν. (He cited the parallel of Arr. *Anab.* 2.24.1: τὰ κλεῖθρα διασπάσαντες.) The supplement <ὀ>νεύοντα, likewise orthodox, is that of Brinkmann ap. Schoene; cf. D46.3 [*100.14*].

On 'beaks' of warships see C54 under **συμβολαί**. Though the second breaching method Ph. advises is somewhat obscure (and made all the more so by the translation in W.M. Murray, *Age of Titans* 297: 'or with the anchors, hauling them up from the merchant ships that are loaded (with assault gear?) out front'), this sense of ἔναψις is surely distinct from the one at A37.7–8 [*82.38–39*]; I do not understand *attractio* (as opposed to *connectio*) in Arnim, *Index* 28 s.v., but both Diels-Schramm 70 ('Einhaken') and Garlan 318 ('pattes') seem to be on plausible lines. (For an authoritative survey of ancient Greek anchors and their component parts see Casson, *Ships* 252–257 with figs. 183–187. What he says there seems to warrant the use of 'arms' as, in effect, a technical term where anchors are concerned.)

D24–29 [98.34–99.10]: beginning the assault

D24.2–4 [*98.35–37*] **παρακαλέσας τοὺς στρατιώτας καὶ τὴν αὐτὴν ἐπικήρυξιν τῇ προτέρᾳ συντελέσας** ('(when you have) exhorted the troops and made the same proclamation as before'). As regards this previous proclamation, Garlan 397 n.*24a* cites 'C9'; when corrected to D9.3–5 [*97.11–13*], this is clearly right. (W.M. Murray, *Age of Titans* 297 cross-references to D6(.5–7) [*96.46–48*] as well as D9, but we are long past the time – and psychological context – for the ban on gratuitous damage and foraging in the surrounding territory.)

For exhorting the attacking troops see also D68.2–3 [*101.38–39*]. Instances elsewhere include Diod.Sic. 15.30.4, 17.46.1; Plb. 5.4.6, 5.60.3, 8.13.5, 10.14.3. Defending commanders, naturally, do the same: see e.g. Diod.Sic. 15.93.3, Plb. 1.45.3. Polybius classifies such speeches for rhetorical/historiographical purposes as *paraklêseis* – the substantive cognate with the verb Ph. uses here – as opposed to deliberative speeches (*dêmêgoriai*) and speeches by envoys (*presbeutikoi logoi*): Plb. 12.25a.3. In Diodorus's version of this tripartite typology (Diod.Sic. 20.1–2) the *paraklêseis* are subsumed under what he calls speeches of praise and blame, *enkômia* and *psogoi*; for this dichotomy in Ph. see D68 under **παρακάλει**. (The debate, begun by M.H. Hansen in 1993, over the historicity of battle – and by extension siege – exhortations that are presented in direct speech by ancient historians need not be rehearsed here. Hornblower, *Commentary* 2.82–83 provides a useful summary of the initial exchanges; and for a recent contribution, with further bibliography, see E.M. Anson, 'The general's pre-battle exhortation in Graeco-Roman warfare', *G&R* 57 (2010) 304–318.)

D24.4–6 [*98.37–39*] **ποιοῦ τὴν προσβολὴν πάντοθεν τῆς πόλεως καὶ κατὰ γῆν καὶ κατὰ θάλασσαν, ἐὰν ἔφαλον ᾖ τι τοῦ τείχους** ('conduct the assault on the city

from all sides, both by land and by sea, if any of the wall is sea-fronting'). Arnim, *Index* 59 claims this as an instance of πάντοθεν as a preposition (i.e. πάντοθεν τῆς πόλεως); contrast, if so, π. as an adverb at C30.6–7 [*93.16–17*], D72.2 [*102.10*] and D88.4 [*103.22*] (and twice already in *Bel.*: 57.28, 70.13). LSJ s.v. registers no prepositional usage, however. In the present passage τὴν προσβολὴν … τῆς πόλεως (rather than ἐπὶ τῇ πόλει or the like) would be awkward, arguably, but not intolerable.

Clearly a simultaneous terrestrial and naval assault, if the attackers' strength permitted it, could have the effect Ph. wants here (in the ἵνα-clause: maximizing fear, and making the defenders spread their forces too thinly). For such a comprehensive onslaught see e.g. Diod.Sic. 20.86.4 on Rhodes in 305: 'next day Demetrius made a similar assault by sea but also gave orders to attack by land from all sides, with loud cries and trumpet calls, so as to induce anguish and fear in the Rhodians, with so many things distracting them' (τῇ δ' ὑστεραίᾳ κατὰ μὲν θάλατταν ὁ Δημήτριος παραπλησίαν ἐποιήσατο τὴν ἐπίθεσιν, κατὰ δὲ τὴν γῆν προσέταξεν ἅμα πανταχόθεν προσβάλλειν μετ' ἀλαλαγμοῦ καὶ σάλπιγγος, ὅπως εἰς ἀγωνίαν καὶ φόβον ἀγάγῃ τοὺς Ῥοδίους, πολλῶν τῶν ἀντισπασμάτων ὄντων). On the naval aspect see further below, D29 under **Ποιητέον**.

D25.1–4 [*98.42–45*] **Ἐνεργῆ δὲ σοι τὰ βέλη πάντα ἔστω καὶ οἱ κριοὶ καὶ τὰ τρύπανα καὶ οἱ κόρακες καὶ αἱ ἐπιβάθραι καὶ κατὰ γῆν καὶ κατὰ θάλατταν εἰς τοὺς προσήκοντας τόπους** ('Let all your artillery be in action, and the rams and the drills and the ravens and the assault-bridges, both by land and by sea, into the appropriate places'). On drills and ravens see C15 under **τῷ κριῷ**; on assault-bridges, C14 under **Πρὸς δέ**.

A sentence like this, on the face of it, shows Ph. at his most banal and unmilitary; perhaps the epitomization process has jettisoned material that was more nuanced.

D26.1–3 [*98.45–47*] **ποιοῦ τὴν προσβολὴν ἐκ διαδοχῆς τῶν στρατιώτων μηθένα παραλιπών** ('conduct the assault with successions of troops, exempting no-one'). The paradosis is μηθέν, i.e. 'overlooking nothing', but an emendation to masculine μηθένα (Diels) is standard.

At B56.5 [*90.38*] Ph. has used the phrase ἐκ διαδοχῆς in connection with fire-signalling. Its 'waves of attackers' application, here, is a commonplace in Diodorus (11.8.2, 12.61.3, 13.55.5, 13.56.4, 13.59.7, 13.64.7, 15.26.4, 16.74.2 & 5, 17.22.1, 17.24.4, 17.67.5, 17.85.6, 18.13.1, 18.34.4, 20.45.7, 20.88.8, 20.97.7, 22.10.6; R.K. Sinclair, 'Diodorus Siculus and fighting in relays', *CQ* 16 (1966) 249–255), and see also e.g. Plb. 3.116.8, 16.33.1; Dion.Hal. *AR* 3.49.3, 3.65.4, 4.19.2, 8.17.2, 8.19.2, 9.16.7, 9.21.3; Joseph. *BJ* 3.212. For the echo in *Par.Pol.* 204.13–15 (4.10–11) see **Appendix 3** passage no.2.

Onas. 42.7–13 recommends the tactic at length; he uses other language, for the most part, but he shares the aim of keeping the attacking troops fresh. (His term for that, in 42.11 repeated from 22.1, is ἀκμῆτες, familar in such contexts from Homer and still in use in Hellenistic and later historiography. Ph.'s ἵνα ἀκμάζοντες ἀεὶ κινδυνεύσωσιν here (D26.3 [*98.47*]), is an unusual – and etymologically unrelated – variant on that theme.)

D27.1–3 [*98.48–50*] **Καὶ θόρυβον πολὺν ποιεῖν καὶ σάλπιγγας ἀνίεσθαι κατὰ τὰ ἰσχυρότατα τῆς πόλεως** ('Also, make a great hubbub and sound trumpets at the strongest (parts) of the city'). For the continued echo in the *Par.Pol.* (204.15–18 (4.11–15)) see, again, **Appendix 3** passage no.2. It has the trumpets sounded 'at night', νύκτωρ. Diels wanted to add that adverb here in Ph. too, but nobody has followed him. Arguments for and against seem to me finely balanced: the Byzantine writer often adds items of interpretative matter to his originals that may or may not be warranted; on the other hand Onas. 42.17 (concerning trumpets) does have ἐν νύκτι.

On trumpets see generally J.K. Anderson, 'Cleon's orders at Amphipolis', *JHS* 85 (1965) 1–4, esp. 1–2; M.L. West, *Ancient Greek Music* (Oxford 1992) 118–121; P. Krentz, 'The *salpinx* in Greek battle' in Hanson (ed.), *Hoplites* 110–120. For noise and trumpets employed together see e.g. Diod.Sic. 20.86.4, quoted at D24 under **ποιοῦ**. Diodorus uses there the term *alalagmos*, for which see also e.g. Hdt. 8.37.3, Onas. 29.1 and Arr. *Anab.* 5.10.4. A variety of other 'cry/noise' words is also found (*boê*, *kraugê*, etc.); with Ph.'s *thorubos* (in its fundamental sense: LSJ s.v.) cf. e.g. Xen. *Anab.* 4.2.20, ἴεντο δὴ οἱ πολέμιοι πολλῷ πλήθει καὶ θορύβῳ. See also Veget. 4.12: *tubarum strepitu hominumque permixto*.

Given the limitations on those trumpet-calls which had fixed, accepted meanings (cf. Garlan 397 n.27*a*), an outcome such as Ph. wants here (D27.3–7 [*98.50–99.3*]) will perhaps have had to be explained to the troops in advance. In a battle context cf. e.g. Xen. *Anab.* 3.4.3–4, 4.2.1 & 7, 4.3.29–32, 6.5.25–27.

D27.3–4 [*98.50–51*] **ἵνα ὑπολαμβάνοντες ἁλίσκεσθαι ταύτῃ τὸ τεῖχος κτλ** ('in order that (those inside), supposing that the wall is being captured there, etc.'). Front. *Strat.* 3.9.5–6 recounts, in brief, two nocturnal attacks by fifth-century Athenian generals where trumpet-calls bring about this sort of confusion: Pericles at a place and time indeterminable; Alcibiades in (?)Byzantium in 409 (Front. says *Cyzicum*, but τὴν Κύζικον ἀτείχιστον οὖσαν in Thuc.8.107.1 is incompatible with an episode involving *moenia*). See also e.g. Polyaen. 2.36 (Dioitas at Heraia, first half of 230s), 3.9.42 (Iphicrates, generic), 5.23 (Tynnichus at Theodosia, c.262).

D28.1 [*99.3*] **Αὐτὸς δὲ ὅπως μὴ διακινδυνεύσῃς** ('You yourself, though, should not participate in the combat'). See D20 under **Αὐτός**.

D29.1–4 [*99.6–9*] **Ποιητέον δ' ἐστὶν καὶ ἐμβολὰς εἰς τὰ μεταπύργια τῷ ἀχρειοτάτῳ τῶν μεγάλων σκαφῶν, ἐὰν ᾖ τόπος ἀγχιβαθὴς καὶ προβλῆτας ἔχων κατὰ τὸ τεῖχος** ('Make impacts, too, into the curtains with the most unserviceable (one) of your large vessels, if the location is deep-water and has (?)inlets by the wall'). Schoene and Diels-Schramm 71 mark a lacuna before this material begins. I concur with Garlan 319 in seeing no need for one.

In large measure this advises the attackers to do what C59.1–5 [*95.20–24*] has already warned the defenders might happen: 'If stretches of the walls are by deep water ['Εὰν δὲ ἀγχιβαθεῖς τόποι τῶν τείχων ὦσι], (offshore) mounds are to be prepared, in order that there is no access at this point and that a beak of (one of) the large vessels does not penetrate into the wall'. The present version makes it even

clearer that only a single ramming vessel is involved (one fit for nothing else; evidently it is likely to be sacrificed in the attack).

The passage also contains a difficult textual crux, in the phrase immediately after ἀγχιβαθής. It is transmitted as προσβλητὰς ἔχων, which Schoene was content to retain, while mentioning the alternatives of προσβλήτως ἔχων (Buecheler: disposed to momentary impacts?) and προσαγωγὰς ἔχων (Brinkmann, citing ἵνα μήτε προσαγωγὴν ἔχῃ at C59.3 [*95.22*]). Diels's προβλῆτας ἔχων is printed by Diels-Schramm 71 (with a typographical error in the phrase appended, κακαὶ τὸ τεῖχος, which has found its way onto the online TLG) and by Garlan 319. But what are προβλῆτες in this context? LSJ's definition (*forelands, headlands*) seems to be followed by Diels-Schramm ('Vorsprünge') and W. M. Murray, *Age of Titans* 297 ('extensions'); however, the periphrasis in Garlan ('donnant accès à la muraille') seems to me to give the sense required, and for a one-word equivalent I have tentatively borrowed 'inlets' from Lawrence 103.

W. M. Murray, *Age of Titans* 297 n.40 reasonably warns against surprise about Ph's claim that city walls might be vulnerable to ramming by a warship. He invokes the naval parallel used by Diod.Sic. 20.95.1, in a description of two enormous ram-tortoises deployed by Demetrius Poliorcetes at Rhodes: 'each held a ram (with a length) of a hundred and twenty cubits, ironclad and having an impact like that of a ship's beak'. (The general point can stand even if the 120-cubit figure is exaggerated – or else employs the shorter Macedonian cubit posited by W. W. Tarn, *Hellenistic Military and Naval Developments* (Cambridge 1930, repr. Chicago 1984) 15–16; but Tarn's theory has few adherents nowadays.)

D30–33 [99.11–20]: mining

D30.1–3 [*99.11–13*] **Δεῖ δὲ καὶ ταῖς ὑπορύξεσι τῶν τείχων λαθραίως χρᾶσθαι καθάπερ καὶ νῦν χρῶνται <οἱ> μεταλλεύοντες** ('It is also necessary to employ tunnelling-operations under the walls in secret, exactly like (ore-)miners employ nowadays'). The manuscripts do have the adverb λαθραίως, and most editors retain it. Diels-Schramm 71 unnecessarily 'correct' to the cognate adjective λαθραίοις, agreeing with the noun ὑπορύξεσι.

On tunnelling see generally A1 under **μηδ' ὑπορύττηται**. The noun Ph. uses to describe it here, ὑπορύξεις, is very rare but cf. Athen.Mech. 31.6 (Περὶ δὲ ὑπορύξεων καὶ στωϊδίων κατασκευῆς). The terminological analogy between military tunnelling and commercial mining has appeared already: see C7 under **Προς δὲ τὰς μεταλλεύσεις**, and further under the next lemma.

For the echo of this passage in *Par Pol.* 212.6–7 (11.24–25) see **Appendix 3** passage no.4.

D31.1–3 [*99.13–15*] **ἐὰν δὲ ἀντιμεταλλεύοντων τῶν ἔνδοθεν συντρηθῇ ἢ εἰς λεπτὸν συνέλθῃ τὸ ὄρυγμα** ('If those inside (the city) are countermining (and) the(ir) excavation is bored into or almost meets (yours)'). On this topic see already A10 under **ταφρείαν**, and further at D49 [*100.20–22*], which uses the term ἀνθυπορύξεις. That noun is a *hapax legomenon*, but the cognate verb ἀνθυπορύσσειν

appears in Aen.Tact. 37.1–7, at 37.5, and also in Polyaen. 6.17, on the defence of Ambrakia against the Romans in 189 (for which episode cf. Plb. 21.28.7–9, preserved in the *de obsidione toleranda*; Liv. 38.7.4). With Ph.'s ἀντιμεταλλεύειν in the present passage cf. Plb. 1.42.12 (Lilybaeum vs. the Romans in the 240s) and 16.31.8 (Abydos vs. Philip V in 200). Note, additionally, Ph.'s use here of the verb συντετραίνειν, which in context can reflect, it seems, technical mining vocabulary; cf. Demosth. 37.38 on those liable to prosecution in an Athenian *dikê metallikê* (τὰς μεταλλικὰς εἶναι δίκας τοῖς κοινωνοῦσι μετάλλου καὶ τοῖς συντρήσασιν εἰς τὰ τῶν πλησίον – '… those who bored into the neighbouring shafts').

Well-known instances of countermining, besides the ones referred to already, include Barke vs. the Persians in c.512 (Hdt. 4.200, Aen.Tact. 37.6–7) and Rhodes vs. Demetrius Poliorcetes in 304 (Diod.Sic. 20.94.1–2).

D31.4–5 [*99.16–17*] **χρηστέον ἐστὶ τοῖς βουπόροις καὶ τοῖς γαισοῖς καὶ ταῖς ζιβύναις καὶ τοῖς τρισπιθάμοις καταπάλταις καὶ τοῖς διμναίοις πετροβόλοις** ('use ox-piercers and javelins and lances and three-span (0.693 m.) catapults and two-mina (873 gr.) rock-projectors'). The first and third of these items have already been recommended to the defenders, for hand-to-hand combat: see C23 under **ἐκ τῶν πλαγίων**. Associated with them here are, apparently, *gaisoi* or *gaisa* (γαισοῖς is the long-established emendation by Rigaltius – the Dutch scholar Nicolas Rigault (1577–1654) – of the transmitted γαρσοῖς); they are mentioned in the Septuagint (*Joshua* 8.18, *Judith* 9.7) and elsewhere, e.g. the second-century papyrus P.Teb. 230; Diod.Sic. 13.57.3 (used by Carthaginians); Plb. 6.39.3–4 and (= Roman *pila*) 18.18.4; Athen. *Deipn.* 6.273F (Iberian).

On three-span catapults see C26 under **Δημοσίᾳ**. Two-mina petroboloi are otherwise unattested in literary sources (the parenthetical, and theoretical, discussion of two-mina weights in *Bel.* 69.11–27 can hardly be relevant), but Rihll, *Catapult* 291 registers archaeologically-reconstructible instances of this calibre from Sounion.

D32.1–2 [*99.18–19*] **καὶ καπνιστέον τοὺς ἐν τοῖς μετάλλοις ὄντας** ('and make smoke (to suffocate) those who are in the mines'). Again (D30 under **Δεῖ δὲ καί**), for the echo – though not of the unparalleled καπνιστέον – in the *Par.Pol.* (212.9 (11.28)) see **Appendix 3** passage no.4. (Note also Syrianus Magister 13.35, καπνῷ καταπνίγοντες.) The best-known instance of καπνίζειν is in Demosth. 54.4, where, according to the plaintiff, the opponents claim that his slaves directed smoke against them when they were preparing a meal. (It is not a verb found in military contexts.)

Ph.'s own antecedent is Aen.Tact 37.3 & 5. It presents a number of textual problems but the gist is clear enough: 'if the (enemy's) underground excavations encounter anywhere the trench (you have dug), that is where you must place timbers and set fire to the (above-mentioned) shavings and cover over the rest (of the workings), so that the smoke may proceed into the hole and injure those in it; possibly many of them will be killed by the smoke. … In short, at whatever point (the attackers) are tunnelling, there you must counter-tunnel and counter-attack and start a fire' (ἂν δὲ τὰ ὑπορύγματα τῆς τάφρου πῃ προσπέσῃ, ταύτῃ ἐπιβάλλοντα ξύλα καὶ τὸν φορυτὸν ἐμπρῆσαι καὶ τὰ ἄλλα κατασκεπάσαι, ὅπως ὁ καπνὸς εἰς τὸ διόρυγμα

πορεύσηται καὶ κακῶς ποιήσῃ τοὺς ἐν τῷ ὀρύγματι ὄντας· ἐνδέχεται δὲ καὶ πολλοὺς ἀπολέσθαι αὐτῶν ὑπὸ τοῦ καπνοῦ … Χρὴ δὲ ἁπλως εἰπεῖν καθ' ὅν τινα τόπον ὀρύσσουσιν, ἀνθυπορύσσειν καὶ ἀντιοῦσθαι καὶ ἐμπιπράναι).

The classic illustrative episode for the counter-attacking use of smoke in mines, Ambrakia vs. the Romans (D31 under **ἐὰν δέ**), involved burning feathers and charcoal in a large pot and using bellows to direct the smoke forcibly against the enemy (Plb. 21. 28.12–17, Liv. 38.7.11–13, Polyaen. 6.17). That certainly represents something more elaborate, as we see, than Aeneas had advised. Ph.'s own recommendation is summary in the extreme; here again (cf. D25 under **Ἐνεργῆ**) one may well suspect that detail has been a casualty of epitomization.

On Roman military casualties in a counter-mine of the mid-third century CE, perhaps killed there by smoke, see S. T. James, 'Stratagems, combat, and "chemical warfare" in the siege mines of Dura-Europos', *AJA* 115 (2011) 69–101.

D33.1–2 [*99.19–20*] **Κοινὰ δέ ἐστιν ἀμφοτέρων ταῦτα καὶ τῶν πολιορκουμένων καὶ τῶν πολιορκούντων** ('These (tactics) are common to both sides, the besieged and the besieging'). The scope of ταῦτα seems likely to cover everything mentioned in D31.3–32.2 [*99.15–19*], i.e. the weapons and light artillery as well as the smoke. And for maximum coherence (and convenience to the reader) something of this could advantageously have appeared as part of C7 [*91.19–24*]. It is Ph.'s general practice otherwise to frontload parts A-C of the treatise and deal with matters more summarily here in part D; for this see esp. D41–56 [*99.48–100.46*].

Material in part D which could (should?) have been included in C is discussed in the Comm. to D42 [*99.51–100.2*] and D48 [*100.17–20*].

D34–40 [99.21–47]: construction of equipment

D34.3–4 [*99.23–24*] **ταῖς σιδηραῖς καὶ χαλκαῖς χρηστέον ἐστὶ <λεπίσι> καὶ ταῖς μολυβδαῖς κεραμίσι** ('use should be made of iron and bronze <plates> and lead (?)tiles'). On the supplement see D17 under **φράξας**, such plates – iron ones at any rate – having already been mentioned in that context (concerned with general protection, not expressly against fire).

Diels-Schramm 72 tacitly correct the conjunction in σιδηραῖς καὶ χαλκαῖς here to 'or' (*oder*) rather than the transmitted 'and', which is arguably an expedient one should apply to the later καί also; that Ph. is recommending heavy-duty metal coverings of iron/bronze *and* of lead does not seem plausible. Quite what he did mean, though, is less than pellucid overall, and Diels-Schramm further complicate the issue by translating the whole phrase 'eiserne oder eherne Schuppen und bleierne Ziegel' and giving their fig.30 the caption *Schuppendecke* but directing the reader to it after 'bleierne Ziegel'. If they grasped the difference (other than metallic) between Ph.'s *lepides* and *keramides*, therefore, they failed to made it clear. (Both terms seem to imply overlapping, at any rate if the *lepides* are visualized in their well-attested sense of 'scales'; cf. the Diels-Schramm figure.) I am not certain I can do better, but three options should, at least, be canvassed:



(i) Follow Schoene in retaining the paradosis, i.e. without λεπίσι. This produces a clause which, albeit rather odd in word order, takes all three adjectives (iron, bronze, lead) with the only noun used, *keramides*.

(ii) Regard Ph.'s shift from *lepides* to *keramides* as a mere verbal variation, not intended to convey a substantive distinction. (For the two words in close proximity cf. Plb. 10.27.10 on the Persian royal palace at Ekbatana, the interior of which he reports as having lavish silver or gold *lepides* and silver *keramides*.)

(iii) Find another meaning for lead *keramides* here. It is true that the orthodox 'tiles' sense has good parallels in Moschion FGrH 575 F1.2 ap. Athen. *Deipn.* 5.207A and 207B, on Hieron's *Syrakosia*: 'as each part of the vessel was built it was overlaid with *keramides* made out of lead' (ταῖς ἐκ μολίβου ποιηθείσαις κεραμίσιν), and six months later, at completion, all its timbers 'were covered with lead *keramides*' (μολυβδίναις κεραμίσιν ἐπεστεγνοῦντο). On the other hand another passage in the same writer, Athen. *Deipn.* 14.621A, tells the tale of Ptolemy II's tormentor, the satirist Sotades, whose fate was to be confined εἰς μολυβῆν κεραμίδα – a lead "pot", clearly – and drowned. (For lead 'amphoras' see C56.6 [*95.14*] with Comm.)

D34.4–6 [*99.24–26*] **καὶ τῷ φύκει διερῷ εἰς δίκτυα ἐμβαλόντα καὶ τοῖς σπόγγοις νοτεροῖς καὶ τοῖς κωδίοις ὄξει βρέξαντα ἢ ὕδατι** ('and wet seaweed (packed) into nets put on (them) and damp sponges and fleeces soaked in vinegar or water'). The coverings mentioned under the preceding lemma seem to be principally for protection against the impact of blows, but now Ph. turns to fire-proofing proper.

On seaweed see generally A76 under **σάξαντας**, and on seaweed-filled nets as protective covering, C4 under **ἢ ἐκ τῶν**. Sponges have not been mentioned before (but will feature again at D77.5–6 [*102.35–36*], in instructions for writing secret letters). Polyaen. 6.3 declares that 'the best protection against fire is to rub on vinegar – for fire ignites this least – and to attach a sponge full of water'. (On vinegar see generally B9 under **δεῖ ὄξους**.) The fleeces (κώδια) fill a role similar to that of the hide screens (*derreis*) in C5.3–5 [*91.13–15*].

See further under the next lemma.

D35.1–3 [*99.26–28*] **ἢ ἰξῷ ἢ τῷ αἵματι τέφραν μίξαντα ἀλείφειν τὰ ξύλα, ᾗ μάλιστα πῦρ οἴει προσπεσεῖσθαι** ('or (use) birdlime or mix ash with blood and daub the timbers (at the place) where you think fire is especially likely to occur'). Diels-Schramm 72 translate 'man mischt Asche mit Leim oder Blut', and similarly Lawrence 103 'with ash mixed with birdlime or blood', but in my opinion Garlan 319 is right to differentiate between the birdlime, used by itself, and an ash-plus-blood mixture ('à l'aide de glu ou de sang mélangé de cendre'); likewise already Oldfather et al., *Aeneas* 183 n.1. In Aen.Tact. 34.1 – assuming the correctness of Meineke's supplement there: see Whitehead, *Aineias* 197–198; *contra* Bettalli, *Enea* 324 – only the former is mentioned (μᾶλλον δὲ ἰξῷ προαλείφειν. τούτου γὰρ πῦρ οὐχ ἅπτεται); in the echo in the *Par.Pol.* (**Appendix 3** passage no.6) only the latter.

On birdlime see generally B53 under **ἰξόν**, and on its efficacy in these circumstances cf. Thphr. *de igne* fr.61; Plin. *HN* 33.94.

D36.1–4 [*99.29–32*] **Ποιοῦνται δὲ αἱ γερροχελῶναι ἐκ τῶν πλεχθέντων γέρρων ἄνωθεν ἐς ὀξεῖαν γωνίαν συγκλεισθέντων πρὸς ἄλληλα, ὡσαύτως δὲ καὶ ἐκ τῶν πρόσθεν** ('Wicker-tortoises are made out of plaited wicker closed together with each other at the top in an acute angle, and similarly at the front'). Such tortoises have been briefly mentioned at D19.2–3 [*98.18–19*]; further detail is now given. D36–37 [*99.29–37*] as a whole have echoes in *Par.Pol.* 207.12–16 (8.1–5): see **Appendix 3** passage no.3.

D37.2–3 [*99.33–34*] **δοκίδων κάτωθεν μὲν ἐκ τῶν πλαγίων τετραγώνων συμπαγεισῶν** ('square screens fitted together below (rising) out of the flanks'). Here and again in D38.2–3 [*99.38–39*], ἄνωθεν ἐκ σανίδων ἰσχυρῶν συμπηγνύμεναι (Haase's standard emendation for συμμιγνύμεναι there), Ph. uses a verb, συμπηγνύναι, identified by Garlan 207 n.12 as the *terminus technicus* for such construction (with διαλύειν its opposite). He cites Arr. *Anab.* 2.21.1, 2.26.2, 4.2.2, 5.24.4; Polyaen. 4.2.20; Vitruv. 10.13.3. One could add e.g. Plb. 3.42.8 (rafts); D.C. 39.4.2, 68.26.2, 69.4.4.

D37.3–4 [*99.34–35*] **ἔνδοθεν δὲ στρογγύλων ὑποτεθεισῶν** ('and (?)rollers placed underneath inside'). The word στρογγύλων here is evidently a neuter noun (Arnim, *Index* 75), not the adjective Ph. uses elsewhere, and I have followed orthodoxy in how to translate it: 'Walzen' (Diels-Schramm 72), 'rondins' (Garlan 320), 'rollers' (Lawrence 103). Nevertheless this feature is rather puzzling in a design intended, as we are now told (D37.4–6 [*99.35–37*]), to be light and easily portable. I wonder whether its στρογγύλα were, rather, cross-sections of log fixed face-downwards, simply to give the tortoise firm foundations.

D38.1–4 [*99.37–40*] **Αἱ δ' ἐπὶ τῶν λέμβων χελῶναι κατασκευάζονται περιφερεῖς ἄνωθεν ἐκ σανίδων ἰσχυρῶν συμπηγνύμεναι, ὑπόφαυσιν κάτωθεν ἔχουσαι, ὅθεν οἱ λιθοβόλοι ἀφίενται** ('The tortoises on the *lemboi* are made rounded above, assembled out of strong planks, and have an aperture, below, from which stone-projectors fire'). This takes up and adds detail to D21 [*98.24–26*], q.v. For similarly 'rounded' ram-carrying tortoises see D40.3 [*99.46*].

The term ὑπόφαυσις is a great rarity, and may well be borrowed (even if indirectly or unconsciously) from Herodotus's description of Xerxes's celebrated pontoon-bridge over the Hellespont in 480; there the ὑπόφαυσις is the gap left open, to allow small boats to pass through (Hdt. 7.36.2). There is also a plural instance in the Septuagint (*Ezechiel* 41.16: part of his vision of the temple).

W.M. Murray, *Age of Titans* 298 n.44 is no doubt right to comment that *lemboi* would only be suitable for carrying lithoboloi of relatively light calibre.

D39.1–2 [*99.41–42*] **Αἱ δὲ χωστρίδες τὰ μὲν ἄλλα παραπλησίως· τροχοὺς δὲ ἔχουσαι καταστεγεῖς ἔμπροσθεν γίνονται** ('Filler(-tortoise)s (are constructed) similarly in most respects but they have wheels and are roofed in front'). This takes up D10.7–11.5 [*97.26–34*], q.v. For the echo (of D39 [*99.41–44*] as a whole) in *Par. Pol.* 209.4–6 (11.2–4), see **Appendix 3** passage no.4.

In the phrase 'roofed in front', καταστεγεῖς ἔμπροσθεν, I follow Garlan 320 and Lawrence 105 in ignoring Diels's supplement (printed in Diels-Schramm 73) which has these filler tortoises decked as well as roofed: <κατάφρακτοι καὶ> καταστεγεῖς. (For καταφράκτους ναῦς see already D22.2 [*98.28*].) The justification for such a supplement, seemingly, is the ensuing statement (D40.1–2 [*99.44–45*]: see the next lemma) that ram-carrying tortoises 'have neither of these (features)', but the other feature encompassed in that phrase might be the aperture, for stone-projectors, of the ship-borne tortoises (see under the preceding lemma).

The adjective καταστεγής itself, overlooked in LSJ, is a very rare variant – in fact attested only here and in the *Par.Pol.* (above) – of κατάστεγος (A14.1 [*80.32*], C14.6–7 [*92.1–2*]).

D40.1–4 [*99.44–47*] **Αἱ δὲ κριοφόροι οὐδέτερον ἔχουσι τούτων ἐκ τοῦ πρὸς τοὺς ἐναντίους, ὑπότροχοι δὲ ποιοῦνται, καὶ περιφερεῖς οὕτως ἔμπροσθεν ἐνδέσεις καὶ ἀντίτονα ἔχουσι <…>** ('Ram-carrying ones have neither of these (features) in the (part) facing the enemy, but they are made with wheels underneath, and they have rounded junctions at the front, thus, and (?)guy-ropes <for …>.'). On what is meant by 'neither of these features' see under the preceding lemma.

Unlike the other kinds of tortoise reviewed in this section, ram-carrying ones have not been mentioned before (and will not be mentioned again); they have simply been taken for granted in passages like D25 [*98.42–45*]. Relevant sections of later authors in the genre: Athen.Mech. 12.12–14.3 (with Whitehead and Blyth, *Athenaeus* 98–103); Apollod.Mech. 153.8–155.13 (with Whitehead, *Apollodorus* 94–100).

Understanding what Ph. is saying here runs into difficulties towards the end. The noun *endeseis* is one that he has used already, at A62.2–3 [*84.19–20*], of the links between towers and curtains; exactly what is being fastened to what in the present context is obscure, however. As to *antitona*: though construed here by Lawrence 105 as an adjective ('stretched'), orthodoxy sees it, rather, as a neuter plural substantive from that adjective. As such it has a seemingly relevant parallel, as noted in LSJ s.v., in Plut. *Marcell.* 15.3: the "Archimedean" defence of Syracuse against the Romans includes several technologies designed to disable their ships, including having them δι' ἀντιτόνων ἔνδον ἐπιστρεφόμεναι. Here in Ph., Diels-Schramm 73 render *antitona* as 'Kran', which might be over-elaborate; Garlan 320 opts more cautiously for 'câbles'. Translation aside, their function in a ram-carrying tortoise is of course likely to be something to do with the ram itself, but the paradosis peters out before any enlightenment can be provided; all editors since Schoene have adopted Buecheler's lacuna which marks the loss of the end of this sentence and (see under the next lemma) the beginning of the next.

D41–56 [99.48–100.46]: counter-measures

D41.1 [*99.48*] **Δεῖ δὲ> πρὸς τὰ ἐπιρριπτούμενα ἀμφίβληστρα** ('<… It is necessary>, against wrappings that are being thrown on'). On the initial lacuna see under the preceding lemma.

Throughout most of this section, as here at the start, Ph.'s general mode of presentation is to begin with a πρός (= *contra*: Arnim, *Index* 70) phrase, describing what the defenders are doing, and then say how the attackers should respond by way of appropriate counter-measures. (For sudden and temporary switches to the defenders' perspective see D42 under **ἔστι δὲ ταῦτα** and D48 under **Πρὸς δὲ τοὺς κριούς**.) And commonly what the defenders are doing, or trying to do, is to adopt the very tactics and methods Ph. has advocated – in this instance at C65 [*95.39–44*].

See further under the next lemma.

D41.2–4 [*99.49–51*] **ἢ τοὺς κόντους [τοὺς] πλαγίους παραβάλλειν ἢ ταῖς λαμπάσιν ὑφαπτέον αὐτὰ <ἢ> [ἀντὶ τῶν ἐγχειριδίων] ξιφοδρέπανα ἔχοντα ἐπικόπτειν** ('either to thrust out poles sideways or to set them on fire from below with torches or to trim them off (using tools) which have sword-scythes'). On the second deletion here see C37 under **Ἔστι δὲ τὰ ὑποσυνθήματα**.

The first of these three methods involves the use of implements, *kontoi*, which both Diels-Schramm 73 ('Speere') and Garlan 320 ('lances') envisage as actual weapons. I have followed Lawrence 103 in calling them 'poles', which would be perfectly serviceable for a task like this; cf. e.g. Thuc. 2.84.3 (Peloponnesian warships in the Gulf of Corinth in 429 are corralled together by Phormio's fleet and have to be manually separated: τοῖς κοντοῖς διεωθοῦντο).

The second is self-explanatory. For ὑφάπτειν – here only, in Ph. – cf. e.g. Aen. Tact. 28.7 (attackers) and 32.1 (defenders); Polyaen. 4.6.3 (the Megarians, besieged by Antigonus Gonatas, set pigs on fire to alarm his elephants).

The third is noteworthy for its use of a word so unusual that it generated an intrusive gloss. (The deletion was by Schoene, detecting the same phenomenon as at A2.2 [*79.8*] and also at D34.4 [*99.24*], where διερῷ provoked the marginal comment ἀντὶ τοῦ ὑγρῷ [sic]). Simple *drepana*, scythes or sickles, have been mentioned in C49 [*94.32–34*], as attached to wheels that the defenders can roll down upon their assailants if the latter are attacking uphill. The present passage's *xiphodrepana*, however, are attested only twice elsewhere: in Hesychius ξ 79, where a ξιφοδρέπανον is summarily defined as ἡ λεγομένη ἅρπη, ὅπλον, and in a learned papyrus chrestomathy of the second century CE, which in a partially-preserved section on weapons and their originators (P.Oxy 1241 col.vi lines 22–24) credits the ξιφοδ[ρέπανον to Perseus and – if the Hesychius-based restoration is correct – likewise says that some call it a ἅρπη. Hesychius's supplementary gloss, ὅπλον, can mean either an implement or tool in general; more specifically, a weapon. His primary one, ἅρπη, is a word attested as an agricultural sickle from Hesiod (*Op.* 573) onwards, a scimitar in e.g. Pherecydes of Athens FGrH 3 F11 (Perseus cuts off Medusa's head with one; see also Apollod.Myth. 2.39, Servius on *Aeneid* 9.503; and cf. Eurip. *Ion* 191–192 on Heracles and the Lernean Hydra), and 'bill-hooks' (so LSJ s.v., II.4) in Joseph. *AJ* 14.424 & 426 (boxes full of soldiers with large ones are deployed to pull bandits out of their mountain caves). Only the last of these instances has any obvious bearing on the present passage of Ph., which remains obscure on several counts – not least the fact that the *xiphodrepana* appear to be attached to something else, unstated (poles?): compare ξιφοδρέπανα ἔχοντα here with τοὺς τροχοὺς δρέπανα ἔχοντας in C49.2 [*94.33*].

In his comment on τοῖς δρεπάνοις χρῆσθαι at D47.3 [*100.16*], Garlan 399 n.47*d* avers that the *drepana* of that passage are '[s]ans doute peu différentes' from the *xiphodrepana* of the present one. I should prefer to say that if Ph. intended to convey a substantive difference by using (slightly) different terms, we cannot perceive what it is. Thankfully Ph. does not obscure these matters even further by using – in any passage – the term *dorudrepanon*, for which the attestation elsewhere is copious by comparison (e.g. Plat. *Lach.* 183D, 184A; Plb. 21.27.4–5; Strab. 4.4.1; Pollux 1.120, 1.137, 10.144; D.C. 39.43.4; Anth.Gr. 11.89.2) and where the *doru-* ('spear') prefix presumably signifies a shaft with the *drepanon* at its tip. The Polybius passage, from the Roman siege of Ambrakia, is especially instructive in that regard: the defenders' counter-measures succeed in breaking the *dorudrepana* into their two constitutent parts. Compare also e.g. Polyaen. 3.10.15 (Timotheus at Torone in 364 places *drepana* on the ends of 'masts') and App. *BC* 5.119 (δρέπανα δόρασι περιθέσθαι in a naval context).

See further below, D47 under **Πρὸς δὲ τούς**.

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D43.3–5 [*100.4–6*] **πρὸς δὲ τὰ κεράμια καὶ τὰ κρυπτόμενα ὀρύγματα τοῖς σειρομάσταις χρῆσθαι** ('but against pots and concealed excavations use probes'). Installing these pitfalls has been recommended to the defenders in A76 [*85.22–29*] and C32 [*93.25–29*] respectively.

For the echo of the present passage in *Par.Pol.* 209.12–13 (11.11–12) see **Appendix 3** passage no.4; it does not, however, extend to repetition of the striking noun Ph. uses here, *seiromastai*. Its definition in LSJ s.v. σιρομάστης (sic: cf. B6 under **σιρούς**) as 'prop. *pit-searcher*, i.e. a *probe* or *gauge*, with which tax-gatherers searched corn-pits and magazines, used in war to try whether there were pits in the ground' invokes this very passage of Ph. (LSJ's '*barbed lance* of the same shape' sense, in the Septuagint and elsewhere, seems to be secondary.)

D44.1–6 [*100.6–11*] **Πρὸς δὲ τὰς <βόθροις ἐπι>τιθεμένας θύρας καὶ τοὺς τριβόλους τοὺς καταβαλλομένους ἐνδρομίδας ἔχοντας ὑποβαίνειν καὶ τὰς μὲν προπειράζοντας ταῖς δικέλλαις ἀνασκάπτειν, τοὺς δὲ τοῖς κηπουρικοῖς κτεσὶν ἀνακαθαίρειν** ('Against doors that are being laid <over pits> and (against) *triboloi* that are being thrown down, men wearing boots (must) go in: the former they test for in advance with mattocks and dig up; the latter they clear with gardening rakes'). The manuscripts have Πρὸς δὲ τὰς τιθεμένας θύρας, which Schoene printed with a lacuna before the participle. His apparatus, nevertheless, noted πρὸς τὰς ἐπὶ βοθρεύμασι τιθεμένας in the very similar *Par.Pol.* version of the phrase: 212.4–5 (11.23); **Appendix 3** passage no.4. For Ph., Diels suggested the text I give here, which both Diels-Schramm 73 and Garlan 320 go so far as to print without angled brackets.

These defence tactics have been presented in C51 [*94.36–40*], albeit (as noted in the Comm. there) as ones purportedly suited to meet an attack from the sea. As regards the present passage's ideas on how the attackers are to neutralize them, the key point is that this is a job not for machines but for men, who need more than usually stout footwear (in the *Par.Pol.* version, wood-reinforced) to undertake it. Compare generally Polyaen. 1.39.2 on Nicias at Syracuse in 415, spreading *triboloi* which immobilize the enemy' horses; peltasts wearing 'thick sandals' (στερεὰ ὑποδήματα) then move in for the kill; cf. Garlan 399 n.44*b*. (Rihll, *Catapult* 7 with n.19 showcases the present passage as a vignette of a Hellenistic "minefield" and how it could be cleared, but her paraphrase of it – 'once detected, [the *triboloi*] could be extracted from the ground with a two-pronged mattock, then swept up by others with a garden rake' – conflates the detail of the two processes Ph. describes.) On *endromides* see generally LSJ s.v. Pollux 3.155 associates them with runners, and a scholiast to Callimachus, *Hymns* 4.238 (where the phrase 'swift *endromides*' occurs), calls them the footwear of hunters; only Ph. uses the word in a military context.

Though προπειράζειν is not (*pace* Arnim, *Index* 69) a *hapax legomenon*, it is certainly very rare indeed. No instance earlier than Ph. is known. LSJ s.v. registers the one in Oribasius (*Coll.med.* 8.3.7, excerpting the first-century-CE medical writer Herodotus, on hellebore), προπειράσαντες τὸ φάρμακον ἀκινδύνως; and τοὺς προπειράσοντας ταῦτα ἔχειν occurs in one of the orations (6.39) of Dio Chrysostom.

For mattocks, again at D56.3 [*100.46*], see B49 under **δικέλλας**.

The verb ἀνακαθαίρειν in this sense is used again in D55.5 [*100.43*], and cf. the cognate noun in D55.2–3 [*100.40–41*].

D45.1–2 [*100.11–12*] **Πρὸς δὲ τὰς ὠρυγμένας τάφρους ἐπιβάθρας ἐπιβάλλειν** ('Against trenches that have been dug, impose assault-bridges'). Digging trenches has been urged upon the defenders several times in the parts of the treatise which

adopt their perspective, above all at A36–38 [*82.28–42*] and A69–78 [*84.43–85.35*]. What the attackers can do about this is a topic already aired, preliminarily, at D10.9–11.5 [*97.27–34*]; the present passage, as transmitted, takes a brisker and more broad-brush approach. On *epibathrai* see C14 under **Πρὸς δέ**.

D46.1–3 [*100.12–14*] **Πρὸς δὲ τοὺς προβαλλομένους λίθους χεῖρας σιδῆρας ἐπιρριπτοῦντας ὀνεύειν** ('Against stones that are being hurled forwards, grip them with "iron hands" and winch them (away)'). The infinitive transmitted here is φονεύειν, but one cannot murder stones; ὀνεύειν (Brinkmann ap. Schoene) is the standard correction; cf. D23 under **Τὴν δὲ διάσπασιν**.

For the defenders' stone-throwing – in various ways other than by lithoboloi/petroboloi – see C8–10 [*91.25–38*] and C19 [*92.27–29*]. What is now recommended as the appropriate counter-measure by their opponents presupposes a size of stone too large to be removed without technological assistance. (I do not understand, incidentally, why Garlan 321 translates προβαλλομένους as overhanging: 'disposées en surplomb'.) On winching of another kind see Aen.Tact. 31.1.

When "iron hands" are mentioned in military narratives they seem to begin as modest, hand-held weapons, i.e. grappling irons or grapnels, and – like Ph.'s own σιδηραῖ ἁρπάγαι in D55.4–6 [*100.42–44*] – they are deployed on water (so e.g. Thuc. 4.25.4, 7.62.3 and 7.65.1; Diod.Sic. 13.50.5 (and Polyaen. 1.40.9), 13.67.2, 13.99.4; Casson, *Ships* 121 n.87; and compare generally the Roman equivalent, *ferreae manūs*). However, by the second half of the fourth century if not before they seem to be in use in terrestrial siege contexts also: witness Diod.Sic. 17.44.2 on the defence of Tyre in 332, where both "ravens" (C15 under **τῷ κριῷ**) and "iron hands" grasp and remove Alexander's attacking troops; also e.g. Liv. 28.3.7, on Orongis in 207 (see A79 under **αἱ ἀγκυρωτοί**), where those ladder-climbing Romans not pushed outwards by pitchforks are hauled upwards by 'iron "wolves"' (*lupi ferrei*; cf. Veget. 4.23). In any event Plb. 8.6.2 (and Plut. *Marcell.* 15.3) on the defence of Syracuse against the Romans indicates that much larger devices using the same principle were in existence in Ph.'s time. There is no reason to suppose, even so, that he expects the general run of besieging armies to have "hands" of Archimedean sophistication at their disposal.

D47.1–3 [*100.14–16*] **Πρὸς δὲ τοὺς κατακρημνωμένους τριβόλους καὶ δοκίδας καὶ τοὺς προτιθεμένους φορμοὺς τοῖς δρεπάνοις χρῆσθαι** ('Against suspended *triboloi* and (?)screens and thrust-out baskets, use scythes'). The first of these tactics has been recommended to the defenders at A79.2 [*85.36*], albeit misplaced there. (Garlan 399 n.47*a* cross-references to what, in this context, are the wrong sort of *triboloi*. See A79 under **οἱ τρίβολοι**.) The present passage's *dokides* are therefore perhaps the ἀγκυρωτοὶ δοκίδες mentioned in that same connection (A79.2–3 [*85.36–37*]), though they have been visualized as poles; a 'plank' or 'screen' sense of *dokis* might make a better fit here.

Employing 'baskets' has not been previously mentioned for this defensive purpose (see rather C33.3–4 [*93.31–32*]), but compare generally C3–5 [*91.3–15*].

It is unclear whether the phrase τοῖς δρεπάνοις χρῆσθαι implies a hand-held operation or something more elaborate; cf. D41 under **ἢ τοὺς κοντούς** (end). (For

scythes in another context see C49 under **Ἐὰν δὲ ὁ τόπος**; and – a separate issue – further under the next lemma.)

D48.1–4 [*100.17–20*] **Πρὸς δὲ τοὺς κριοὺς καὶ τὰ τρύπανα καὶ τοὺς κόρακας τοῖς ἐνετῆρσι καὶ ταῖς κεραίαις καὶ τοῖς περιβαλλομένοις βρόχοις καὶ τοῖς λοιποῖς κρίκοις** ('Against rams and drills and ravens (the defenders should use) blowers and cranes and nooses thrown around (them) and the rest of the rings'). Beyond Garlan's non-committal remark that Ph. 'n'a pas jusqu'ici mentionné la présence de corbeaux [*korakes*] du côté de la défense' (Garlan 399 n.48*a*), the problems which this passage presents have gone unappreciated.

If it is taken for granted that Ph.'s recommendation here conforms with the great bulk of part D by being addressed to the attackers (offering them counter-measures against the threats with which the sentence opens, transmitted as Πρὸς δὲ τοὺς κριοὺς καὶ τὰ δρέπανα καὶ τοὺς κόρακας), the difficulty first and foremost is this mention of rams on the defence side; cf. A50 under **ἐκ τοῦ πλαγίου**. Such a mention of them here might be tolerable, arguably, if it were taken to be a loose reference back to the very specific (and theoretical) matter of the counter-ram in C15–17 [*92.8–22*], but on balance my judgment would then be that their inclusion in this short list is simply an error on the part of an epitomator or scribe, and that the words [τοὺς κριοὺς καί] should be deleted accordingly. However, to take that step would still leave the passage a troubling one from a substantive point of view – for not only (as Garlan: above) are the 'ravens' here a weapon that hitherto has only been mentioned on the attacking side (at C15.7 [*92.14*] and D25.2 [*98.43*]), but every single one of the *counter*-measures listed has hitherto, conversely, only been mentioned on the *defending* side: blowers at C13.3 [*91.45*], cranes at C10.2 [*91.34*], nooses at A51.3 [*83.36*] and C14.11–12 [*92.6–7*]. Buecheler's standard emendation for the obviously faulty κριοῖς at the end of the present passage (see lemma above) associates 'rings' with nooses, and I have also adopted it on my own account for C14.10 [*92.5*]: see the Comm. thereto.

These problems vanish if D48 – with D42 [*99.51–100.2*] as parallel and precedent – is regarded as a sudden (and temporary) lurch by Ph. from the attackers' standpoint to that of the defenders: hence my supplemented translation above. They are using weapons that we already know them to have; and the mention of rams on their opponents' side becomes unproblematical.

The one textual change I do adopt has already been indicated: Graux's τρύπανα for the transmitted δρέπανα, scythes. (The slip would have been a very easy one to make after δρεπάνοις in the immediately preceding line.) Schoene dismissed Graux's emendation as improbable ('vix recte'), and Garlan 321 does not even mention it, but possible objections fall away, surely, once we accept that τοὺς κριοὺς καὶ τὰ τρύπανα καὶ τοὺς κόρακας are three things brought against the city in attack, and are indeed associated with each another in two other passages: C15.6–7 [*92.13–14*], D25.2 [*98.43*]. (I should in candour note two instances in Appian – *Annib.* 139 on Tarentum in 212 and *Lib.* 67 on Utica in 204 – where attackers' δρέπανα are countered βρόχοις. In the first they are hurled on the ends of ropes, intended to grip and dislodge the stones in the wall of the akropolis; in the second they are an attempt, by an actual mode of deployment unspecified, to strip the walls of their hides and other coverings.)

In their apparatus criticus Diels-Schramm 74 note Diels's opinion that λοιποῖς is 'bezweifelt', but no alternative is suggested.

D49.1–3 [*100.20–22*] **Πρὸς δὲ τοὺς πυροφόρους καὶ τοὺς τριβόλους τοὺς καιομένους καὶ τὰς λαμπάδας καὶ τὰς ἀνθυπορύξεις τοῖς εἰρημένοις** ('Against incendiaries and burning *triboloi* and torches and counter-tunnelling operations, use the (tactics) mentioned'). The last-named of these topics guarantees that, after the unheralded shift of perspective in D48 [*100.17–20*], Ph. is once again viewing matters through the attackers' eyes; cf. D31 under **ἐὰν δέ**.

D30–32 [*99.11–19*] is, indeed, the cross-reference that he must have in mind in respect of the counter-tunnelling. The three fire-related hazards here do not match prior passages so easily, because the contexts where they have been expressly mentioned as being used by the defenders do not (as transmitted) include suggestions for counter-measures; see rather, and generically, D34–35 [*99.21–28*]. (Garlan 399 n.49*b* again – cf. D47 under **Πρὸς δέ** – cross-references to the wrong kind of *triboloi*.)

D50.1–3 [*100.22–24*] **Τὰς δε παλιούρους σκάπτοντας εἰς <τὸ> τὰ τέλματα καταχωννύναι** ('The thorn-hedges should be dug (up) for piling into <the> ponds'). The supplement <τό>, suggested by Brinkmann ap. Schoene, was not printed by Schone himself, though his successors have regarded it as necessary. Brinkmann's τέλματα (for the transmitted λείμματα), on the other hand, instantly became a self-recommending corrigendum.

Creating these obstacles had been recommended to the defenders at A70.4 [*84.50*] and A77 [*85.29–32*]. Here Ph. economically suggests that removing the one be combined with neutralizing the other. (For an alternative filling medium see D51 under **πρὸς μὲν τάς**.)

See further under the next lemma.

D50.3–4 [*100.24–25*] **τὰς δ<ὲ χαρακώσεις> ἐκκόπτοντας εἰς τὰς ἐγχώσεις τῶν τάφρων καταχρῆσθαι** ('and the <palisadings> cut out and used for the fillings-in of the trenches'). Though Schoene did not see the need for one, a noun in the accusative plural does seem to be missing here. The suggestion of Brinkmann ap. Schoene, σκόλοπας, requires the transmitted τὰς δ' to be emended to τοὺς δ' (which in fact Schoene printed). Diels-Schramm 74 take up Diels's own suggestion τὰς δ' <αἱμασίας>, and this is followed by Garlan 321 (Lawrence 105 leaves the noun indeterminate); however, their translations – 'die Zaunhecken' (Diels-Schramm), 'les branchages' (Garlan) – describe wooden material, not a 'wall of dry stones' (LSJ s.v. See in full S. Price and L. Nixon, 'Ancient Greek agricultural terraces: evidence from texts and archaeological survey', *AJA* 109 (2005) 665–694; prudently, they do not include the present passage in their dossier (687–691) of 33 texts which mention a αἱμασία). Setting that mystery aside, my suggestion is as above. For χαρακώσεις see already A37.1–2 [*82.32–33*], A54.3–4 [*83.46–47*] and A82–83 [*85.46–86.2*] (and in the singular in D88.3 [*103.21*]).

On the defenders' trenches see generally A36–38 [*82.28–42*] and A69–78 [*84.43–85.35*]. Citing the present passage, LSJ s.v. ἔγχωσις defines the noun as *bank*, *dyke*, but the sense required here is almost the opposite.

D51.1–2 [*100.25–26*] **Πρὸς δὲ τὰς τῶν πετροβόλων εἰς τὰς στοὰς γινομένας πληγάς** ('Against the blows of rock-projectors received by stoas'). On stoas see generally A50 under **τὰς προσῳκοδομημένας**, and further below under **πρὸς δὲ τὰς ἐκ τῶν πλαγίων**.

D51.2–5 [*100.26–29*] **πρὸς μὲν τὰς ἄνωθεν ἐπιβάλλειν γέρρα τριπλᾶ καὶ ἐπ' αὐτὰ φορμοὺς ἐμπιμπλῶντα ἀχύρων ἢ φύκους** ('against the ones (striking) against the top, put on three layers of wicker and, on these, baskets filled full of chaff or seaweed'). Chaff is not a commodity that Ph. has mentioned before (but see again at D62.2 [*101.21*]). Chaff-filled baskets were put to military use – for filling trenches – by Hannibal when withdrawing his forces from Akragas in 262 (Plb. 1.19.13); for chaff-filled 'sacks' (*sakkoi*) used in the way Ph. envisages here see Joseph. *BJ* 3.223–224, on the defence of Iotapata in 67 CE. (The response of the Roman attackers was to cut them with *drepana*, as in D47.1–3 [*100.14–16*] above.)

Rihll, *Catapult* 120 reasonably comments that protection of this modest order is one indication of 'the normally small caliber of stone-throwers on walls'.

D51.5–6 [*100.29–30*] **πρὸς δὲ τὰς ἐκ τῶν πλαγίων προσχωννύναι τοὺς τοίχους ἄχρι τῶν γέρρων** ('against the (blows coming in) from the flanks, heap earth against the (stoas') sides as far as the wicker'). At D50.2–3 [*100.23–24*] καταχωννύναι (εἰς) has referred to a process of completely filling something with earth; now προσχυννύναι describes piling earth against something which remains, otherwise, above ground.

This approach to the problem suggests certainly one and perhaps two things about the kind of stoas that Ph. has in mind. One, self-evident, is that even if they have been moved to their current position (rather than being built *in situ*) they are now stationary. Further, if they are vulnerable to being hit ἐκ τῶν πλαγίων they are probably transverse to the wall, and thus "communications" stoas, rather than "combat" ones parallel with it; cf. Graux on the distinction at A50 under **τὰς προσῳκοδομημένας**. See further under the next lemma.

D52.1–2 [*100.32–33*] **Πρὸς δὲ τὰ ἐνιέμενα ὕδατα ἐξαγωγίδας ὀρύσσειν** ('Against waters that are being directed in, dig drainage-channels'). Garlan 400 n.52*a* correctly relates this back to C13; to be specific, C13.1–3 [*91.43–45*], the opening and general context of which make it clear that in the present passage Ph. is still talking about 'dug-in' (*oruktai*) stoas.

The noun ἐξαγωγίς is otherwise unattested in literary sources but there is an epigraphic instance from third-century Delos (IG xi.2 287, A50: τὴν ἐξαγωγίδα τὴν ἐν τῶι θεάτρωι).

D53.1–4 [*100.33–36*] **Πρὸς δὲ τὰς ἀποτμήσεις τῶν ἀγκυρίων ἐὰν βαθὺς ὁ τόπος, ἀλύσεις, ἐὰν δὲ τεναγώδης, τὰς ἀγκύρας τῶν πλοίων χῶναι καθέξουσιν** ('Against the anchor-cables being cut off: in deep water chains, in shallow water funnels, will hold fast the anchors of the vessels'). A sudden shift from land (back) to sea.

Ph.'s choice of initial noun here, ἀπότμησις, is very rare (if not the outright *hapax legomenon* of the analogous ὑπότμησις at D42.3 [*100.2*]), with no surviving attestations before him. We may note in passing the nod to style, even in epitomized Ph. which begins each of D53 [*100.33–36*], D54 [*100.36–39*] and D55 [*100.39–44*] with feminine *–sis* nouns, whether familiar or unusual, in the plural.

Immediately after τὰς ἀποτμήσεις, both Diels-Schramm 74 and Garlan 321 print Diels's 'correction' of the transmitted τῶν ἀγκυρίων to τῶν ἀγκυρείων, but I can find no justification for this beyond several lexicographers' definition of πείσματα as τὰ ἀγκύρεια σχοινία παρὰ τὸ πείθεσθαι δι' αὐτῶν τὴν ναῦν; so e.g. *Synagoge* π 269. The paradosis in Ph., in my opinion, is adequately justified by Diod.Sic. 14.73.4, τῶν ἀγκυρίων ἀποκαιομένων. (LSJ s.v. ἀγκύριον I register the present passage as an instance of ἀγκύριον as a diminutive of ἄγκυρα, but that is not the sense needed here; see rather their s.v. II, '**ἀγκύρια** (*sc.* πείσματα), τά, *anchor-cables*', with the Diodorus passage cited.)

The defenders have been advised to cut their opponents' anchor-cables (under cover of darkness or stormy weather) in C60 [*94.25–28*]. As noted in the Comm. there, a good example of the use of chains – instead of the customary cables or ropes, for which see Casson, *Ships* 250 with n.101 – occurs in Arrian's account of the besieging forces at Tyre in 332; this thwarts the Tyrian divers (Arr. *Anab.* 2.21.6).

The alternative scenario sketched here is for shallow-water conditions. (The adjective τεναγώδης is a correction by Brinkmann ap. Schoene. Schoene himself retained the meaningless paradosis τεδίονες, as well as the transmitted βραχύς earlier in the sentence instead of Brinkmann's βαθύς, and most oddly of all τὰς ἀγκύρας τῶν πύργων; Diels's πλοίων is nowadays standard.) The χῶναι Ph. recommends for such circumstances evidently sheath the cables: they are 'Trichter' (Diels-Schramm 74), 'gaines' (Garlan 321); cf. generally B29.1–2 [*88.16–17*] and C52 [*94.40–43*]. W.M. Murray, *Age of Titans* 298 n.45 comments that '[a]lthough the term used here, χῶναι, literally means "funnels", the context demands that we envision some sort of covering which protects the anchor line, perhaps flaring toward the upper or lower end in the shape of a funnel'. In Diels-Schramm 75 fig.31 (depicting both of Ph.'s precautions) it flares, in fact, at the sea-bed end.

D54.1–4 [*100.36–39*] **Πρὸς δὲ τὰς ἐκτρυπήσεις τῶν νεῶν κύκλῳ φύλακας καταλειπτέον καὶ τὰς σανίδας παρορμιστέον, ἐξ ὧν ἔχοντας τριόδοντας τηρεῖν τοὺς ὑποδενδρυάζοντας** ('Against the ships being drilled-out, they need to be encircled with guards and moored beside planks, from which (men) with tridents keep a lookout for those lurking under water'). The phrase τὰς ἐκτρυπήσεις τῶν νεῶν (its last word is Schoene's suggested correction, confined to his apparatus, of the transmitted ἐν) balances τὰς ἀποτμήσεις τῶν ἀγκυρίων at the opening of the previous chapter. Ph. uses the (rare) noun only here, but cf. C60.3–4 [*95.27–28*]: the besieged are to send in divers to drill out (ἐκτρυπᾶν) the hulls of their opponents' vessels. For καταλείπειν applied to posting guards see A15 under **βραχεῖά τις**.

The use of tridents as anti-personnel weapons in military operations can be paralleled in e.g. Diod.Sic. 17.43.8 (the Tyrians defend their walls against the troops on Alexander's siege-towers).

The participle transmitted at the end of the sentence is ὑποδελεάζοντας, which Schoene was content to retain despite its lack of an obvious meaning. The conjecture ὑποδενδρυάζοντας, nowadays standard, was made independently by Brinkmann (ap. Schoene) and Diels, largely on the basis of the occurrence of δενδρυάζειν in an inscription from Epidauros (SGDI 3340.20) and as defined in several lexica, above all Etym.Magn. 255.55–256.5, where several senses and applications include that of being under water and concealing oneself there. The compound verb's ὑποδενδρυάζειν (otherwise confined to lexicography) reinforces the idea of concealment.

For τηρεῖν cf. D102.1 [*104.6*].

D55.1–4 [*100.39–42*] **Πρὸς δὲ τὰς ὑποχώσεις καὶ τὰς ἐν τῇ γῇ γινομένας ἀνακαρθάσεις τῶν πιπτόντων λίθων ἀπὸ τῶν τοίχων καὶ τῶν προτειχισμάτων χρήσιμά ἐστιν** ('(Methods) useful against under(water) mounds and, on land, (for) clearances of stones falling from the walls and the outworks are'). The Greek here begins more elliptically than has been found appropriate by translators: a second πρός is implicit before τὰς ἐν τῇ γῇ κτλ., and its sense does shift from introducing what counters something to what facilitates something.

The first noun transmitted is ὑποχωρήσεις. Emmanuel Miller (see A15 under **ἀπὸ τῶν**) made an ingenious case for retaining it, understood in the sense of '(human) excrements' (LSJ s.v., II). Though Schoene printed it, the context does not seem at all favourable; cf. Garlan 400 n.55*a*. Instead, Rochas d'Aiglun's emendation to ὑποχώσεις, albeit unparalleled, has prevailed (as a synonym for the apparently more concrete noun that Ph. has used at C59.2 [*95.21*]: προσχώματα).

D55.4–6 [*100.42–44*] **ἐκ μὲν θαλάσσης <τὰ ἀντλητήρια> οἷς ἀνακαθαίρουσι τοὺς λιμένας καὶ σιδηρᾶ ἁρπάγαι** ('out of the sea, <the scoops> with which harbours are cleared, and iron grapnels'). Schoene marked a lacuna but did not suggest the plural noun needed to fill it. Diels's <τὰ ἀντλητήρια> is printed in both Diels-Schramm 75 and Garlan 321; the latter comments that a less technical term would suffice but does not suggest one. For ἀντλητήρια cf. D.C. 50.34.4.

Dio also provides parallels (66.4.4, *brochoi* and *harpagai* used against rams; 74.11.2) for these 'iron grapnels', which, in broad terms at least, beg comparison with the "iron hands" of D46 [*100.12–14*], q.v. Comm. above. (Garlan 321 seems to me to be on the wrong track with his 'harpons de fer'.) Why Ph. uses another term here is unclear; if any substantive difference is intended, perhaps the grapnels are (significantly) larger.

Another approach to clearing submerged stone obstacles, as Garlan 400 n.55*c* observes, is exemplified by Alexander at Tyre: his men use nooses in the first instance (Arr. *Anab.* 2.21.7).

D56.1–3 [*100.44–46*] **ἐκ γῆς δέ, ὅταν ὑποτάξωσι πρὸς τὰ πτώματα, αἱ χωστρίδες χελῶναι καὶ οἱ μοχλοὶ καὶ αἱ δίκελλαι καὶ αἱ ἄμαξαι** ('but out of the land, when they assign (personnel) to the debris, filler tortoises and crowbars and mattocks and wagons'). Diels-Schramm 75 ('die Schüttschildkröten, sobald sie sie an die Trümmerstätte gebracht haben') and Lawrence 105 ('filling-mantlets when they are positioned towards the debris') restrict the scope of the ὅταν clause to the first of the four items mentioned. I agree with Garlan 321 that it covers all four.

For πτῶμα, whether plural (as here) or singular, as the debris or rubble of fallen walls etc. in a siege context see also e.g. Diod.Sic. 16.8.2, 17.24.4, 17.43.4, 17.46.3, 18.70.5–7, 18.71.2 & 4; Plb. 5.4.9–10, 5.100.6, 10.31.13, 16.31.8, 16.33.1 & 4, 21.28.2, 33.6.7; Joseph. *BJ* 3.249; and generally LSJ s.v. II.2.

On filler tortoises see D10 under **ἢ χελώνας**; on mattocks, B49 under **δικέλλας**; on wagons, B49 under **ἁμάξας**. 'Crowbars' or levers, *mochloi*, feature only here in the treatise, but note already *Bel.* 59.19 and 59.25 (not to mention his entire work Μοχλικά), and cf. e.g. Aristoph. *Pax* 307 (μοχλοῖς καὶ μηχαναῖσιν … ἀνελκύσαι) and Joseph. *BJ* 6.27 (at Jerusalem in 70 CE the Romans prise out some foundation-stones of the Antonia tower χερσὶ καὶ μοχλοῖς; see also 6.222).

D57–58 [100.47–101.2]: repairs to 'machines' etc.

D57.1–4 [*100.47–50*] **Ἐὰν δέ τινος τῶν μηχανημάτων ἡ πρὸς τοὺς πολεμίους καθήκουσα πλευρὰ πέσῃ, στρέψαντας δεῖ πρὸς τοὺς ἐναντίους τὴν ὑγιῆ τὴν τετριμμένην ἐπισκευάζειν** ('Should the face (turned) toward the enemy fall off any of your machines, it is necessary to turn the sound one toward the opponents and attend to the damaged one'). The transmitted πέσῃ, 'fall', is printed by all; Schoene's suggestion (confined to his apparatus) of πονέσῃ, 'suffer damage', is attractive nonetheless, in describing a setback more likely to occur, surely, than outright collapse.

Manoeuvring a machine for this (or any unusual) purpose will have been facilitated by the wheel-system with which it was equipped (D10.4–6 [*97.22–24*] with Comm.); cf. Garlan 400 n.57*a*.

D58.1–4 [*100.50–101.2*] **Πρὸς δὲ τὰ ἄλλα συμπτώματα ἐκ τούτων αὐτῶν δεῖ ἐνθυμουμένους αἰεί τι μηχανᾶθαι μὴ ἀνοήτως** ('Against other misfortunes it is necessary, by cogitating on the basis of these same things, always to contrive something intelligently'). Cogitating ἐκ τούτων αὐτῶν ('selon les mêmes principes': Garlan 322) might extend in its scope back beyond the material of these two chapters, to embrace everything which since D41 [*99.48–51*] has been presented as a problem with an appropriately intelligent solution. Alternatively the phrase means 'on the basis of these same examples'; but if so, epitomization has jettisoned all but the single one given (besides rendering the observation, overall, rather banal).

Ph.'s word for 'misfortunes' here, σύμπτωματα, is also a favourite one in Polybius for such things (43 instances); and L. Robert, 'Inscriptions hellénistiques de Dalmatie', *Hellenica XI–XII* (Paris 1960) 503–541, at 526, brought together some epigraphical examples where it means, specifically, 'les malheurs survenus à la ville'. The Dalmatian one which generated Robert's discussion (507–508), and which contains a phrase he restored as τὰ περὶ|| [τὴν πόλιν γενόμενα συμπ]τώματα, occurs in a Parian decree from its Adriatic colony Pharos (a.k.a. Hvar); see further P.S. Derow, 'Pharos and Rome', *ZPE* 88 (1991) 261–270 (and ensuing discussion, irrelevant to my purposes here, about Roman foreign policy in this area at the time,

the last quarter of the third century); translation in Bagnall/Derow[2] no.31. Note also e.g. Syll.[3] 675 (lines 4–6: Oropos) and IG xii.7 36 (lines 11–15: Arkesine, Amorgos).

With μὴ ἀνοήτως (of which this is the earliest attestation) cf. generally Plutarch on Nicias at Syracuse in 413, begging that nothing be done ἀπεγνωσμένως … μηδὲ ἀνοήτως (Plut. *Nic.* 21.3).

D59–60 [101.2–11]: wrongfooting the defenders' expectations

D59.1–3 [*101.2–4*] **Καὶ ἐὰν μὲν πολὺν χρόνον μέλλῃς πολιορκεῖν τὴν πόλιν, δόξαν ἐμποίει τοῖς πολεμίοις ὡς ὀλίγον χρόνον πολιορκήσων** ('And if your intention is to besiege the city for a long time, give the enemy an impression that you will be besieging them for a short time'). With δόξαν ἐμποίει cf. generally App. *Syr.* 57, δόξαν ἐμποιεῖν ἐσβολῆς. Plb. 4.80.10, on Philip V at Samikon in winter 219/18, conveys the same idea as Ph. with a different noun: ἔμφασιν ἐποίει τοῖς ἔνδον ὡς πολιορκήσων τὸ χωρίον.

On the shifting sense of πολιορκεῖν in D59–60 [*101.2–11*] see D60 under **ἐὰν δὲ πολιορκῇς**. In the context of D59 [*101.2–8*], first, the impression of a short siege was presumably to be created by vigorous aggressive action. If Ph. had any ideas beyond that, epitomization has jettisoned them.

D59.3–5 [*101.4–6*] **ἵνα δαψιλῶς ἀναλίσκωσι τὰ πρὸς τὴν τροφὴν ἀνήκοντα** ('in order that they may liberally consume the commodities earmarked for provisioning'). For the idiom τὰ πρὸς τὴν τροφὴν ἀνήκοντα cf. already *Bel.* 76.37, τὰ πρὸς ἰσχὺν ἀνήκοντα.

On the adjective δαψιλής (and, here, its cognate adverb) in literary and epigraphical sources see generally A. Wilhelm, 'ΔΑΨΙΛΗΣ', *Glotta* 25 (1936) 269–273. The flavour of δαψιλῶς in the present passage is hard to capture exactly in translation ('reichlich', Diels-Schramm 76; 'sans compter', Garlan 322; 'carelessly', B. Campbell, *Military Writers* 161) but it conveys overall the idea of a prodigal approach to resources that ought, in the circumstances, to have been better husbanded.

Ph.'s wish (on the attackers' behalf) that the city will exhaust its food supplies too soon takes up a theme from D15–16 [*97.49–98.4*].

D59.5–7 [*101.6–8*] **μὴ παρασκευάζωνται πρὸς τὰς ἐσομένας προσβολὰς μηδὲ βοήθειαν μεταπέμπωνται** ('may not be prepared for the assaults to come, or send for help'). The threat – from the attackers' standpoint – that reinforcements will (or might) come to the city will be Ph.'s preoccupation from D86.1–2 [*103.12–13*] onwards.

D60.1–4 [*101.8–11*] **ἐὰν δὲ πολιορκῇς, ὡς πολὺν χρόνον προσκαρτερήσων ἀπείλει, ἵνα φοβηθέντες τὸ μέλλον θᾶττον ἡμῖν συγχωρήσωσιν ὃ βουλόμεθα** ('but if you are besieging (aggressively), threaten to persevere for a long time, in order that, fearful of the future, they may concede to us sooner what we want'). The verb *poliorkein* does call for a more emphatic translation than was used at D59.1–2 [*101.2–3*]; cf. 'wenn Du aber wirklich belagerst' (Diels-Schramm 76), 'si, au contraire, tu entreprends un véritable siège' (Garlan 322), 'if you are planning a direct assault' (B. Campbell, *Military Writers* 161). (Garlan 3–7 traces the word's evolution from 'un siège par investissement' at the beginning of the classical period to 'un siège en règle' in Hellenistic warfare.)

Front. *Strat.* 3.5.1–3 has three brief anecdotes – one Greek (also in Polyaen. 2.2.8, though not siege-related there), two Roman – on this general theme (*Quemadmodum persuadeatur obsidionem permansuram*).

For persevering or persisting (προσκαρτερεῖν) in a siege cf. Diod.Sic. 14.87.5 (Dionysius I at Tauromenion in 394), 20.48.8 (Demetrius Poliorcetes at Cypriot Salamis in 307); Plb. 1.55.4 (the Romans at Lilybaeum in 248).

D61–64 [101.11–27]: livestock

D61.1–2 [*101.11–12*] **Πειρῶ δὲ καὶ τὴν ἔνδον οὖσαν λείαν <καὶ> ἐὰν ὑποζύγιά τινα ᾖ, παρελέσθαι** ('Try, too, to remove the livestock that is inside (the city) <and> any draught-animals there may be'). This is *leia* in sense 4 (*flocks and herds, cattle*) of LSJ s.v. λεία (B). Compare e.g. Diod.Sic. 19.21.3, 19.97.1; OGIS 748 (translation Austin[2] no.225), proto-Attalid munificence to Kyzikos in 279/8 includes *ateleia leias* (line 9).

On how this removal might be effected, see under the next two lemmata.

D61.2–3 [*101.12–13*] **ἐξαγοράσαι ὡς ἐλαχίστου μάλιστα δύνῃ** ('buy them up as cheaply as you possibly can'). The paradosis here is ἐξαγορᾶς ἕως. Though Schoene suppressed the conjunction and printed ἐξ ἀγορᾶς, his apparatus proffered the suggestion ἐξαγοράσας ὡς. Brinkmann's variation on that, with an imperative (Diels-Schramm 76), has become orthodox. (For ἐξαγοράζειν as 'buy up' cf. e.g. Plb. 3.42.2; Plut. *Crass.* 2.5.)

The idea of the besieged city agreeing to sell its livestock, no matter what the price, while hostilities were in progress seems inconceivable. Garlan 400 n.61*a* must therefore be right to set such a "normal" commercial transaction in the context of a truce – probably though not necessarily a preliminary one (cf. the next lemma) – of the kind we see in Plb. 5.75.1: Selge vs. Achaeus (the rebel viceroy of Antiochus III) in 218, where 'it became a habitual practice of those from the camp to enter the city πρὸς τὰς σιταρχίας'. (Polybius is prompted to add, in 5.75.2–6, one of his occasional tirades, on the folly of this; and the ensuing narrative, 5.75.7–76.11 explains why, in that instance.)

D61.3–9 [*101.13–19*] **ἐν ταῖς γινομέναις ἀνοχαῖς πρόφασίν τινα λαβὼν πιθανὴν μηκέτι εἰσελάσαι ἄφες μὴ φυλάσσων τοὺς τόπους τούτων ᾗ ἐξελαύνοντες βοσκήσουσιν, ἀλλ᾽ ἔασον αὐτοὺς ἔξω νέμειν καὶ ἔπει<τ᾽ ἐπιδραμὼν> [τὴν ἐνέδραν] ἢ ἐνέδραν κατασκευάσας ἀποτεμόμενος κυρίευσον αὐτῶν** ('seizing some plausible pretext in the truces which occur, let (the enemy) no longer (have to) drive in (the beasts) – by not guarding the places where they drive them out to pasture; rather, allow them outside grazing and then rush in or lay an ambush to cut

them off and take control of them.'). The transmitted text of this sentence, a complicated one in any case, has benefited from several modifications made by Diels; I follow here the version printed in both Diels-Schramm 76 and Garlan 322. (As plausible alternatives, for the transmitted ἐπὶ τὴν ἐνέδραν, to Diels's ἔπει<τ' ἐπιδραμών>, note nevertheless Buecheler's ἔπειτ' ἐν φανερῷ or ἐπιτήδειον ἐπιδρομήν; the latter derives some support from D99.2–3 [*103.46–47*], ἐνέδρας κατασκευάσας ἢ τόπους ἐπιτηδείους προκαταλαβόμενος.)

For the kind of duplicity Ph. endorses here Garlan 400 n.61*b* finds a (broad) parallel in Polyaen. 3.9.36, on Iphicrates and the Samians (on an occasion with few clues to dating but perhaps during the Social War: see Shipley, *Samos* 156 n.7). Ph.'s own suggested ruse seems intelligible enough as stated. (The translation of Garlan 322, looser than mine, does not in my opinion give proper weight to εἰσελάσαι, used alongside ἐξελαύνοντες. It also introduces an unwarranted element with the phrase 'tu t'abstiendras *de faire sortir la cavallerie* pour surveiller les endroits' (my emphasis). I can see no implication of cavalry here; and indeed Ph. never mentions any, on either side.)

D62.1–2 [*101.20–21*] **Οὐθὲν γὰρ ἀναλίσκει τῶν ἐν τῇ πολιορκίᾳ χρησίμων ὄντων** ('For (the livestock) consumes nothing of what is useful in the siege'). Though a long sentence, filling D61 [*101.11–19*], has intervened, all translators are agreed that the unstated subject of the present one, confimed by what follows (ἀλλ' ἢ ἄχυρον ἢ χόρτον κτλ), is the livestock already mentioned. (Either singular λεία or neuter plural ὑποζύγια can govern this ἀναλίσκει.) For fodder (χόρτος) see again D88.5–6 [*103.23–24*] and D90 [*103.28–30*].

With the phrase τὰ ἐν τῇ πολιορκίᾳ χρήσιμα ὄντα cf. generally τὰς ἐν ταῖς πολιορκίαις χρείας in Plb. 1.44.1. (But in that context – what, as the Carthaginians judge, Lilybaeum requires in 250 to withstand the Roman siege – military 'needs' were uppermost; Ph. is focusing on food.)

D63.1–3 [*101.23–25*] **πρὸς ὑγίειαν δὲ καὶ τροφὴν μεγάλα συμβάλλεται διά τε τοῦ γάλακτος καὶ κατακοπέντων καὶ πωλουμένων τῶν κρεῶν** ('and it makes great contributions to health and nourishment because of both the milk and, when it is cut up and sold, the meat'). Garlan 320 translates 'à la santé et à la nourriture *des troupes*' (my emphasis), which makes explicit what Ph. must principally mean.

Milk (on which see generally e.g. Diosc. *de mat.med.* 2.70.1–6) has not featured until this point in the treatise; not even in part B with its recommendations for foodstuffs that the city should have available, and recipes involving some of them. (As with the butter of B46.3 [*89.33*] (q.v. Comm. there), its mention here perhaps shows Ph. influenced by dietary norms north and/or east of the Mediterranean, though in the present instance the appeal to health might reflect the high value set on milk in medical and quasi-medical literature.) Dalby, *Food* 217–218, at 217, declares that milk 'had an unusual status as a food item in the classical world, because milk, as such, will not keep (without the use of refrigeration or other modern techniques). So the drinking of milk was a luxury shared by farmers and nomadic shepherds with those in cities and royal courts, who were rich enough to pay for express delivery'. If Dalby's dichotomy be accepted as the broad-brush one it is, Ph.'s soldiers would have to be associated with the farmers et al., who have direct access to the lactating animals, even though there is no proof here that he envisages them drinking the milk fresh (rather than soured, or in naturally processed forms like yogurt, lassi, curd cheese, etc.). Compare in any event Jul.Afr., *Kest.* 2.6.7–10, writing on 'soldiers' health' (περὶ τῶν στρατιωτῶν ὑγείας): one of his recommendations, repeated in *Sylloge tacticorum* 57.1, is that from the beginning of spring to the end of autumn they have a milk-and-water drink, with a little wine added, before meals.

The second participle here, πωλουμένων, might have been thought a scribal error (displacing one that referred to *cooking* the cut-up meat), were it not for the phenomenon, well-documented elsewhere – and see also D89.3 [*103.27*] – of soldiers on service abroad buying their own provisions, via temporary or permanent markets. For this see e.g. Xen. *Anab.* 1.5.10 and 5.5.14, Diod.Sic. 14.108.1, Arr. *Anab.* 6.23.6, Plb. 11.34.10–12, Polyaen. 3.10.1 & 14; Griffith, *Mercenaries* 264–294, esp. 291; Pritchett, *War* 1.34–49, esp. 36. Alternatively, if Ph.'s remark is more generalized than Garlan (above) supposes, it refers to the economic as well as the nutritional benefits in keeping domestic animals.

D64.1–3 [*101.25–27*] **ἔτι δὲ τὰ δέρματα αὐτῶν πρὸς τὰ μηχανήματα καὶ τοὺς κριοὺς καὶ ὅσα ἐστὶ τοιαῦτα χρήσιμα γίνεται** ('what is more, the skins are useful for the machines and the rams and suchlike'). So already C5.3–5 [*91.13–15*] (from the defence side), D34.6 [*99.26*] and D37.1–2 [*99.32–33*].

D65 [101.28–30]: bribery and other expenditure

D65.1–3 [*101.28–30*] **Μὴ φείδου δὲ χρημάτων μήτε κατὰ δωροδοκίαν μήτε κατὰ τὰς ἄλλας δαπάνας· ἑλὼν γὰρ τὴν πόλιν πολλαπλάσια λήψῃ** ('Do not skimp on money, whether in bribery or in other expenses; once you have taken the city you may recoup many times as much'). For φείδεσθαι cf. already C2.1–3 [*90.49–51*]. As to πολλαπλάσια λήψῃ, I disagree with Arnim, *Index* 68 that this neuter plural is used adverbially; compare rather (e.g.) Xen. *Hell.* 3.5.4, οἱ Φωκεῖς ἐμβαλόντες εἰς τὴν Λοκρίδα πολλαπλάσια χρήματα ἔλαβον.

D96–98 [*103.39–45*] spells out who needs to be bribed – and repeats the point that plunder, once the city is taken, will replenish the coffers (and more); cf. Chaniotis, *War* 129–130. Diod.Sic. 20.63.5 has an apposite anecdote: when Agathocles of Syracuse was besieging 'a certain not inglorious city' and hecklers from the walls shouted 'when will you pay your soldiers?', his reply was 'when I have taken this city'. (For this see also Plut. *Mor.* 176E-F and 458E-F.)

D66–69 [101.31–42]: minimizing risk to troops and their commander

D66.1 [*101.31*] **Καρβάτιναι δέ σοι οἰκίαι <παρασκευαστέαι>** ('Leather-hide houses <should be made ready> for you'). Schoene marked a lacuna after οἰκίαι; this is how, after Diels, both Diels-Schramm 77 and Garlan 322 fill it. (In their apparatus, however, Diels-Schramm suggest that more might be lost.)

On these *karbatinai* (the specification 'houses' seems to be optional) employed by the defenders, see already C19 under **Δεῖ δὲ καί**, and further under the next lemma.

D66.1–3 [*101.31–33*] **ἐκ τῶν καρβατίνων βάλλοντες οἱ λιθοβόλοι καὶ οἱ τοξόται καὶ οἱ σφενδονῆται** ('from out of the leather-hides stone-throwers and archers and slingers do their firing'). Garlan 322 translates λιθοβόλοι as 'les lanceurs de pierres' here, i.e. men rather than machines, and the context surely guarantees that this is right. ('Steinwerfer' (Diels-Schramm 77) leaves the matter ambiguous. Lawrence 105 eliminates ambiguity by rendering the whole passage, mistakenly in my opinion, as 'there should be stone-projectors throwing from the 'brogues', and archers and slingers in great numbers and the best (you have) should be operating (outside)'.)

Archers are expressly mentioned only here, i.e. as attackers, though there has been indirect evidence that the defence too will employ them: see A22 [*81.25–29*], C25.2 [*92.50*], C30.6 [*93.16*]. As regards slingers, this is their sole explicit mention by Ph. in any context, but see C25 under **ἀφοριστέον**.

D67.1–3 [*101.35–37*] **διοίσει γὰρ οὐδὲν ἢ τελευτᾶν ἢ ἀχρείους γίνεσθαι τοὺς κινδυνεύοντας** ('for whether the combatants die or (merely) become unserviceable will make no difference'). That is, wounding among these categories of troops is something no less to be avoided than their death. (ἢ τελευτᾶν (Buecheler ap. Schoene) is printed by both Diels-Schramm 77 and Garlan 323; Schoene retained the transmitted εἴτε λεπτάς (sic).) With διοίσει οὐδέν here cf. οὐθὲν διοίσει in *Bel.* 66.49.

The idiom ἀχρείους γίνεσθαι has been used in A32.8–9 [*82.13–14*], of catapulteers unable to aim their weapons effectively. (For a comparably "technical" sense of being *achreios* cf. Plb. 1.30.9: what could/should have been an adversary's best asset is nullified by bad positioning, ἠχρείωται διὰ τοὺς τόπους.) Its more ghoulish meaning in the present passage – to sustain wounds – is paralleled in e.g. Polyaen. 6.46: about to fight a sea-battle, 'Alexander the Thessalian' orders javelins to be thrown at enemy sailors ἵνα οἱ πλεῖστοι αὐτων ἀχρεῖοι γίγνοιντο. (Though listed separately, this is evidently Alexander of Pherai, and his naval activity in 362/1: cf. [Demosth.] 50.4, Polyaen. 6.2.1–2, and Diod.Sic. 15.95.1–2.)

D68.1–2 [*101.37–38*] **Καὶ αὐτὸς ἐκτὸς βέλους ὢν ἢ ἀσφαλῶς παραπορευόμενος** ('And you yourself, staying out of range or passing along the line in safety'). On this doctrine of the commander needing to keep out of harm's way (D68–69 [*101.37–42*]) see D20 under **Αὐτός**.

The verb παραπορεύεσθαι in this very specific sense ('en circulant le long des lignes': Garlan 323) is not registered in LSJ s.v., and I know of no parallel. (Brinkmann ap. Schoene suggested περιπορευόμενος. Schoene himself cited παριππεύων in Polyaen. 4.3.8 and 6.4.1 and παραθέων in 7.21.7, though presumably not as suggested emendations.)

D68.2–5 [*101.38–41*] **παρακάλει τοὺς στρατιώτας καὶ τοὺς μὲν ἀγαθοὺς γινομένους ἄνδρας ἐπαίνει τε καὶ τίμα, τοὺς δὲ κακοὺς λοιδόρει τε καὶ κόλαζε** ('exhort the troops: praise and reward the men who show bravery, but revile and punish the bad ones'). Such praise/reward – already at D9.3–5 [*97.11–13*] and D24.2–4 [*98.35–37*] – and its obverse, blame/punishment, is a more black-or-white version of the advice given by Aen.Tact. 38.4–5: 'give appropriate encouragement – praise here, an appeal there – to each of the men fighting on the wall. But do not reprimand anyone in anger, even the rank-and-file, which would make them even more disheartened. (5) If it is necessary to reprimand anyone for inattention and indiscipline, let it be those who have most property and influence in the city, which might serve as some sort of object-lesson to the rest. The occasions when one should overlook each of these failings have been discussed in the *Addresses*'. (On that (?)title, Ἀκούσματα, see Whitehead, *Aineias* 14 with 201–202; *contra* Bettalli, *Enea* 12 n.36, 331.) Ph.'s policy in this area is more like that of Onas. 34.1–3, advocating post-battle rewards and punishments.

On *andres agathoi* (a concept which embraces the dead as well as, as here, the still living) see A86 under **Δεῖ δὲ καί**.

D70 [101.42–102.2]: hazards of premature plundering

D70.1–5 [*101.42–46*] **Ἁλισκομένης δὲ τῆς πόλεως φοβοῦ μὴ εἰς διαρπαγὴν ὁρμήσαντες οἱ στρατιῶται αὐτοί τε ὑφ᾽ ἑαυτῶν καὶ ὑπὸ τῶν ἐναντίων παραπόλωνται ἢ πάλιν ἐκβληθῶσιν ἐκ τῆς πόλεως** ('While the city is being captured, be fearful in case the troops rush into plundering and are killed, both by each other and by the opponents, or are expelled from the city again,'). Formally speaking, φοβοῦ μὴ … παραπόλωνται belongs in the tradition of such phrases as φοβούμενοι μὴ σφίσιν οἱ ἐξιόντες χείρους γίγνωνται in Thuc. 1.95.7, on Spartan fears after the Pausanias débâcle. In the present instance Ph. means little more than 'take care in case …'; nevertheless translators have thought it appropriate to retain a residual notion of *phobos* ('musst Du befürchten', Diels-Schramm 77; 'redoute', Garlan 323), and I follow suit.

Ph.'s word for plundering here, διαρπαγή, is well-attested from Herodotus (9.42.3) onwards. With the idiom εἰς διαρπαγὴν ὁρμήσαντες cf. ἐπὶ τὴν τῶν κτήσεων διαρπαγὴν ὥρμησαν in Diod.Sic. 14.53.3 (below), and ὥρμησαν ἐπὶ τὴν διαρπαγὴν τοῦ χάρακος in Plb. 18.27.3. Ph. uses the noun διαρπαγή only here, but note also the cognate verb, διαρπασθέντων τῶν χρημάτων, later in this long sentence (D70.8–9 [*101.49–50*]).

Ph. has already recommended a prohibition on unrestricted *foraging* in the surrounding countryside (D6.5–7 [*96.46–48*]), as part of a policy not to alienate the besieged city's citizens (D7.2–4 [*96.50–97.1*]). Now comes analogous advice on maintaining discipline during the capture of the city itself and the plundering likely to accompany it; and again, keeping the defeated populace tractable – see the next lemma – is given as a rationale, alongside the more narrowly military hazards depicted in the phrases lemmatized here. (For an instance of apparently capturing a city but being expelled again see Diod.Sic. 16.38.3 on Phayllus at Naryka in 352/1: διὰ προδοσίας νυκτὸς παραλαβὼν πάλιν ἐξέπεσε.)

Onas. 42.18–22 addresses the same scenario as Ph. but in much fuller detail, likewise urging restraint. (See also his 38.1–6, and more generally 42.24.) Siege-

narratives themselves can furnish instances of this, such as the Romans at Carthago Nova in 209 (Plb. 10.15–17), but are otherwise replete with its opposite. See e.g. Diod.Sic. 13.55.5–57.7 (the Carthaginians in Selinous in 409) and 14.53.1–3 (Dionysius I at Motya in 397); Plb. 4.57.11–58.12 (the Aitolians at Aigeira in 219) and 7.18.3–10 (Antiochus III at Sardis in 213).

D70.5–8 [*101.46–49*] **ἢ κατασχόντες αὐτοῖς δυσμενεῖς καὶ ἀχρείους πρὸς τὰς λειτουργίας καὶ τὰς εἰσφορὰς ποιήσωσι τοὺς πολίτας** ('or by seizing (items) for themselves make the citizens hostile and unfit for (contributing) services and levies'). Ph. uses the terms *leitourgia* and *eisphora* only in this passage, and the distinction he intends between them is probably between 'services' involving some personal effort and simple cash levies or taxes; in any event, duties now owed to the city's new ruler(s).

Not unlike χορηγία and χορηγεῖν (C72.4 [*96.18*] and C72.10 [*96.24*]), the term *leitourgia* had developed a broad range of meanings by Ph.'s time; they are identified and tabulated in the classic study by N. Lewis, 'Leitourgia and related terms', *GRBS* 3 (1960) 175–184 (with 6 (1965) 227–230). Lewis's findings, drawing on documentary and literary material alike, actually plot an ever-widening scope of generality (181): from the classical-period sense of 'specific state services required of wealthy citizens and residents …: a political *terminus technicus*' to 'any service to the community' and ultimately to 'a service of any kind, for any beneficiary, not necessarily for the benefit of the community'. Though Garlan 401 n.70*b* repeats this in summary terms, where the present passage is concerned it is probably the case, in my view, that services to the community are what Ph. has in mind. See also Quass, *Honoratioren-Schicht* 270–352; and in brief, Chaniotis, *War* 115–116.

Eisphorai present fewer conceptual problems. Chaniotis, *War* 120 calls them '[e]xtraordinary taxes … imposed from time to time'. Such a 'time', i.e. an emergency, is exemplified by Rhodes facing Demetrius Poliorcetes in 305: according to Diod.Sic. 20.84.4 the well-to-do χρήματ᾽ εἰσέφερον, which may or may not fulfil Chaniotis's model of imposition (rather than voluntary payment). More broadly, his definition is unexceptionable as long as it is recognized that, in practice, the frequency of *eisphorai* will have tended to normalize them in the expectation of the payers. In addition to any imposed by cities themselves, internally, Hellenistic *Realpolitik* frequently also necessitated such payments to be made to higher powers, such as the Ptolemaic Empire. (In the course of Syll.[3] 390 [IG xii.7 506], a decree of the synod of the Nesiotic League c.280, Ptolemy II is thanked for confirming his deceased father's 'lightening' (κουφίσας, line 16: lowering or outright remission) of the burden of *eisphorai*.) Note also Diod.Sic. 20.71.1 on Agathocles in 307 exacting a very severe *eisphora* from the affluent in Segesta (ἀπορούμενος δὲ χρημάτων εἰσφέρειν ἠνάγκαζε τοὺς εὐπόρους τὸ πλεῖον μέρος τῆς ὑπάρξεως). For the unpopular *eisphorai* levied on its members by the Achaian Confederacy in the last quarter of the third century see e.g. Plb. 4.60.4–10, 5.30.5, 5.91.4 and 5.94.9 (with J.A.O. Larsen, *Greek Federal States* (Oxford 1968) 232–234).

D70.9–12 [*101.50–102.2*] **μήτε τὰς σιταρχίας ἔχῃς ἀναδιδόναι τοῖς στρατιώταις μήτε ὠφέλεια μηδ᾽ ἥτις οὖν σοι γένηται τούτου συμβαίνοντος** ('you have neither food-allowances to give out to the troops nor, if this happens, is there any advantage for yourself'). Diels-Schramm 77 print σιταρκίας, but the transmitted σιταρχίας (accepted by Schoene and by Garlan 323) in this sense is well-attested, in both literature (e.g. the pseudo-Aristotelian *Oeconomica* and Polybius) and documentary sources such as Syll.[3] 421 (Staatsverträge 480), Aitolia-Akarnania treaty of the 260s; see lines 35–40 there. On *sitarchia* itself – a loose term – see e.g. HCP 1.132–133; Garlan 401 n.70*c*; Pritchett, *War* 1.3 n.2, 22.

The concluding part of this long sentence presents textual obscurity. Though Schoene was content to accept the paradosis, ὠφελείας ὁμιλητὴς οὖν (presumably understood to mean 'with experience of advantage'; cf. generally LSJ s.v. ὁμιλητής, 2), the norm is to emend. Brinkmann's ὠφέλεια μηδ᾽ ἥτις, printed by both Diels-Schramm 77 and Garlan 323, is modelled on μηδ᾽ ἡντιναοῦν in A8.2 [*80.6*].

D71 [102.3–8]: securing strategic locations

D71.1–3 [*102.3–5*] **Καταλαμβάνειν δ᾽ ἐν ταῖς ἁλώσεσι μάλιστα δεῖ τὰ τείχη καὶ τὴν ἀκρόπολιν καὶ τὴν ἀγορὰν καὶ τὸ στρατήγιον καὶ ἐάν τις ᾖ ἄλλος τόπος ἰσχυρός** ('During captures it is particularly necessary to gain possession of the walls and the acropolis and the agora and the generals' office and any other strong place there may be'). Within the (*sc.*) perimeter walls, only one of these strategic locations has been mentioned or presupposed already: the akropolis, generically, at B48.2 [*89.39*]. (The apparent paradosis ἐξ ἀγορᾶς at D61.2 [*101.12*] is usually emended: see the Comm. there.) For a *stratêgion* cf. Aen.Tact. 22.3 (though not necessarily, there, a specific building of that name: see Whitehead, *Aineias* 155); at Sikyon (Plut. *Arat.* 8.4); and other instances, including the well-attested Athenian one (LSJ s.v., 2), cited by Garlan 401 n.71*a*.

The prudence of Ph.'s advice, if it were not self-evident anyway, is often corroborated by siege-narratives. See e.g. Polyaen. 5.5.1 on early emigrants from Chalkis and Megara in Sicily (cf. Thuc. 6.3.1–4.1) vs. Leontini (agora and akropolis) and 7.11.5 on the Persians vs. Chalkedon in 513 (agora); Thuc. 2.2.4 (and Aen.Tact. 2.4) on the Thebans vs. Plataiai in 431 (agora); Plut. *Pyrrh.* 31 on Pyrrhus vs. Argos in 272 (agora); Plb. 2.55.6 on the Spartans vs. Megalopolis in 223 ('gaining advance possession of the opportune places', τῷ προκαταλαμβάνεσθαι τοὺς εὐκαίρους τόπους; Plut. *Philop.* 5.1 specifies the agora). Garlan 401 n.71*c* has more.

D71.4–6 [*102.6–8*] **ἐὰν δὲ ἐλάττων ᾖ ἡ δύναμις, [εἰς] τοὺς πύργους καὶ τὸν ἐπικαιρότατον τόπον, ἵνα μὴ πάλιν ἐκπέσῃ τῆς πόλεως** ('if (your) force is less (than is needed to do so, at least gain possession of) the towers and the most important place, in order that you are not expelled from the city again'). Seizing towers as a preliminary step has already been advocated in D4.3–5 [*96.35–37*]; see the Comm. there.

The *epikairotatos topos* – cf. *eukairous topous* under the preceding lemma, and note Ph.'s own fondness for such expressions elsewhere (A11.4–5 [*80.22–23*], τὰ ἐπικαιρότατα τῶν μεταπυργίων; A44.5 [*83.10*], τινας τῶν ἐπικαίρων τόπων; A48.3 [*83.27*], κατὰ τοὺς ἐπικαίρους τόπους; C68.3 [*96.4*], ἐπὶ τῶν ἐπικαίρων τόπων) – is

likely to be one of the ones listed already, i.e. akropolis, agora or *stratēgion*, though the generality of the wording could accommodate other possibilities if the circumstances highlighted them. Compare generally, from the defence side, Aen.Tact. 22.2: HQ should be the civic buildings (τὰ ἀρχεῖα) and the agora, if they are defensible; otherwise 'a very strong place in the city and one providing maximum visibility of it' (τόπον τῆς πόλεως ἐρυμνότατον τε καὶ ἐπὶ πλεῖστον ἀπ᾽ αὐτοῦ τῆς πόλεως ὁρώμενον, with Whitehead, *Aineias* 154 on ἐπὶ πλεῖστον κτλ).

D72 [102.9–12]: a hierarchy of choice?

D72.1–4 [*102.9–12*] **Ἐὰν δὲ μὴ δύνῃ πολιορκῶν κατὰ κράτος λαβεῖν τὴν πόλιν διὰ τὸ ἰσχυρὰν εἶναι αὐτὴν πάντοθεν, ἐπιχειρητέον ἢ κατὰ <κλοπὴν ἢ> προδοσίαν ἢ λιμὸν αὐτὴν ἑλεῖν** ('If in your siege you cannot take the city by force because of its being strong (when approached) from every side, an attempt should be made to take it either by <stealth or> treachery or starvation'). Given the structure and phraseology of D73–85 [*102.12–103.11*], esp. D73.1 [*102.12*] in this instance, Rochas d'Aiglun's supplement is self-recommending.

The importance of these topics in the genre can also be gauged by the prominent place they occupy in book 3 of Frontinus, *Stratagems*: its sections 1–2 cover surprise attacks (*De repentino impetu*) and deceiving those who are to be besieged (*De fallendis his qui obsidebuntur*), section 3 is on inducing treachery (*De eliciendis ad proditionem*), and section 4 on the means of making the enemy run out of food (*Per quae hostes ad inopiam redigantur*). See also D2 under **μάλιστα** and D60 under **ἐὰν δέ**.

Ph. himself, taken at face value, seems to be saying that the options of stealth (D73–75 [*102.12–27*]), treachery (D76–83 [*102.27–103.3*]) and starvation (D84–85 [*103.4–11*]) are to come into play only when a direct attack has been ruled out – or has failed, as e.g. in Plb. 1.48.10: the Romans in 249 give up their attempt to conduct the siege of Lilybaeum actively (διὰ τῶν ἔργων), instead digging a trench, erecting a palisade, and leaving the outcome to time (χρόνος). This would also be in tune with such things as the Spartan dictum attributed to Lysander by Plutarch (Plut. *Lys*. 7.4, cf. *Mor*. 190E and 229B) and to Cleandridas in Polyaen. 2.10.5 ('where the lion's skin does not reach, one must sew on the fox's'). Likewise e.g. Diod.Sic. 18.13.2, on Leosthenes at Lamia in 323 abandoning unsuccessful βία and beginning a blockade, and Onas. 42.23 (see D16 under **Τοὺς δ᾽ ἀχρείους**); cf. also Liv. 1.52.4 on Tarquinius Superbus at Gabii, trying in succession force (*vis*), blockade (*obsidio*), and finally 'un-Roman' deceit and trickery (*fraus* and *dolus*). (For the opposite see Polyaen. 1 pref. 3–4: the time to try βία is when τέχνη and δόλος have failed.) The reality was more complex, however. Even in Ph. himself, after all, D2–4 [*96.28–37*] have prioritized a strategy based on surprise, which is *klopē* in all but name (see further under the next lemma); and the likelihood that *prodosia* would often be the most effective approach is not only embedded in the assumptions of the genre that Ph. inherited from Aeneas (see General Intro. D.ix.β) but emerges again and again from the actual siege-narratives. 'It is not surprising that a large portion of Philo's *Manual of Poliorcetics* should have been devoted to the age-old techniques of capturing cities by treachery or by blockade. As a matter of fact the pages of Hellenistic history suggest that the former of these was still far more effective than any of the new "scientific" methods' (Winter, *Fortifications* 331–332).

D73–75 [102.12–27]: alternatives to assault, 1 – stealth

D73.1 [*102.12*] **Κατὰ κλοπὴν μὲν νυκτός** ('By stealth, at night'). For the echo – of this phrase, and of D73 [*102.12–19*] as a whole – in *Par.Pol.* 212.11–214.3 (12.1–25) see **Appendix 3** passage no.5.

Pritchett, *War* 2.156–176 has a general analysis of 'Surprise attacks' (with 'Ambuscades' treated separately at 177–189) ; however, his claim there (156) that 'Greek vocabulary seems to have developed no word for a surprise attack' (but confined itself to adjectives and adverbs) overlooks Ph., amongst others. See in any event, on the concept of military stealth (κλοπή), D. Whitehead, '*Klope polemou*: "theft" in ancient Greek warfare' *C&M* 39 (1988) 43–53 (reprinted in E.L. Wheeler (ed.), *The Armies of Classical Greece* (Farnham & Burlington VT 2007) ch.12); E.L. Wheeler, *Stratagem and the Vocabulary of Military Trickery* (*Mnemosyne* suppl. 108: Leiden 1988) 32–33 and passim.

D73.1–8 [*102.12–19*] **ἢ τὰς σκυτίνας κλίμακας προσθέντας, αἳ ῥάπτονται καθάπερ οἱ ἀσκοὶ καὶ ὑπαλοιφῇ κατὰ τὰς ῥαφὰς ὑποστεγνωθεῖσαι φυσῶνται, εἶτα προστιθέντα ἐπὶ ταῖς στυππίναις κλίμαξιν αἳ κατασκευάζονται διὰ πλοκῆς καὶ ῥαφῆς, καὶ πρὸς τὰ πέρατα αὐτῶν ἄγκιστρα προσάπτοντα, ἵνα ἐπιρριπτουμένων τῶν ἄκρων ἐπιλαμβάνηται τῶν προμαχώνων** ('Either apply leather ladders, (the components of) which are sewn just like wineskins and made airtight with grease at the seams and inflated; then attach to oakum ladders, which are constructed by plaiting and stitching, and fasten hooks to their extremities, in order that when the ends are thrown on (to the wall) they catch on the battlements'). The preview of this topic at D4 [*96.33–37*] had focused on ladders, but apparently of an ordinary kind – and indeed, there is no obvious reason why ordinary ladders (on which see generally A12 under **ἵνα αἱ**) would not suffice in this tactic. Nevertheless Ph. unveils here a special design.

While the *Par.Pol.* version of his scheme (cf. under the preceding lemma) describes the process of making them airtight with the phrase τῇ ἀλοιφῇ ἐμφραττόμεναι (213.3–4 = 12.14–15), Ph.'s original is more noteworthy. The noun ὑπαλοιφή is rare but paralleled in fourth-century Athenian naval inventories: IG ii^2 1622.740 and 1627.313–317; in the latter of these, black (evidently pitch) and white (resin or wax) substances are differentiated; discussion in J.S. Morrison, J.F. Coates and N.B. Rankov, *The Athenian Trireme* (2nd edn. Cambridge 2000) 186–188. The verb ὑποστεγνοῦσθαι (so LSJ – but perhaps active ὑποστεγνοῦν?) is a *hapax legomenon*, though στεγνοῦν in the sense of making a building watertight occurs in third-century Delian inscriptions (IG xi.2 154, A36, and 161, A114).

In the *Par.Pol.* version the inflatable ladders seem to do their job unaided – the air keeping them upright, the writer adds – if they are the same height as the wall. Only if the wall is higher do the upper ladders, the oakum ones, come into play. (With these latter cf. generally the 'ladders made out of ropes' in Aen.Tact. 38.7,

ταῖς ἐκ τῶν σχοινίων κλίμαξι πεποιημέναις, though there they are ladders let *down* by the defenders, in order that stones can be retrieved.) Be that as it may, the most striking feature here in Ph. is unquestionably the inflatable component itself. Had such a thing ever been put to the test? One can hardly think so, because the sort of pressures on stitched and inflated skins that made it feasible, even so, to cross rivers on them (as contemplated in Xen. *Anab.* 3.5.9–11 – and implemented in Arr. *Anab.* 3.29.4, cf. 4.4.2 & 4, 5.20.8) would be of a vastly higher order if they were used as ladders. (The extensively supplemented translation in Lawrence 107 arguably makes Ph.'s design less impracticable than it ought to sound: 'by applying leather (and rope) ladders – (the rungs of) which have been sewn like wineskins …, then applied to (side-pieces of) ladders that are made of tow'.)

Improving on ordinary scaling ladders was not an aspiration confined to Ph. (or his source). See in particular Euphranor's self-assembly ones used by the Achaians against Sikyon in 251 – they were subject to such serious wobbling that only one man at a time could ascend, climbing gingerly (Plut. *Arat.* 6–8, at 8.4); also the system adumbrated in Apollod.Mech. 175.2–188.9 (heavily interpolated but with an Apollodoran core: Whitehead, *Apollodorus* 120–132).

D74.1–5 [*102.19–23*] **ἢ τοῖς σιδηροῖς πασσάλοις, οἳ στομωθέντες καὶ ὀξυνθέντες καὶ εἰς τὰς πέτρας κατὰ τὰς διαφύσεις καὶ εἰς τοὺς λιθίνους τοίχους κατὰ τὰς συμβολὰς καὶ εἰς τοὺς πλινθίνους ἐγκόπτονται σιδηραῖς σφύραις ὑπὸ τῶν ἀναβαινόντων** ('Or (use) iron pegs which have been tempered and sharpened: they are knocked by the men climbing up, with iron hammers, into rocks where the cracks are and into stone walls where the joints are and into brick (walls).'). For the echo in *Par.Pol.* 260.7–11 (48.3–7) see **Appendix 3** passage no.7.

Apart from the noise entailed, which would jeopardize the element of surprise, this is a very much more realistic method than the inflatable ladders. Lawrence 106 adduces for comparison Arr. *Anab.* 4.19.1–3 (Alexander's men scale the Sogdian Rock in 327 using small iron tent-pegs, πασσάλους μικροὺς σιδηροῦς) and Liv. 28.20.1–5 (African deserters among the Roman auxiliaries in Spain in 206 climb the precipitous citadel rock at Iliturgi with the aid of the iron nails, *clavos ferreos*, that they carried). One could add Arr. *Anab.* 6.10.3 – when scaling-ladders fail at 'the great city of the Mallians' in 326/5, the expedients that Alexander's troops resort to include driving *passaloi* into the wall – with the proviso that this wall was of earth, and the pegs therefore probably wooden.

D75.1–5 [*102.23–27*] **<ἢ> τοῖς ἀγκίστροις τοῖς σιδηροῖς, ἅπερ ἐπὶ καλῳδίων <πρὸς τὰς ἐπάλξεις> ἐπιρριπτοῦνται ἄμματα ἐχόντων, ὥστε μὴ χαλεπῶς καὶ κατὰ ταῦτα ἔχειν ἀναβαίνειν τοὺς στρατιώτας ἐθισθέντας, καθάπερ Αἰγύπτιοι ποιοῦσιν αὐτό** ('Alternatively, (use) iron hooks which are thrown <onto the parapets> on cords which have (the sort of) loops that create no difficulty for habituated soldiers to climb up by, just as the Egyptians do it.'). Again, for the echo in the *Par. Pol.* (260.11–261.2 = 48.7–13) see **Appendix 3** passage no.7. (That is the source of the supplement <πρὸς τὰς ἐπάλξεις> added here by Schoene, to universal approval. By contrast, no-one has agreed with him in seeing the need to change ἐπιρριπτοῦνται into singular ἐπιρριπτεῖται.)



'Hooks' (ἄγκιστρα) have already featured in D73.6 [*102.17*], at the ends of the oakum scaling-ladders. On 'cords' (καλῳδία) see A37 under **ὑπὸ τῶν**. The equipment now described has no precise parallel in the siege-narratives, though it sounds simple enough in principle; a light grappling-iron or grapnel, in effect. The novelty of Ph.'s suggestion appears to reside in the manner of climbing once the hooked end is secure. (Lawrence 106 raises the possibility that Ph.'s ἄμματα might be knots rather than loops; the latter is the translation he gives nevertheless, with the appended comment that 'Egyptians still walk up the trunk of a date-palm within the loop of a band passed around the tree and the climber's back, so that he can lean against it, slackening it only momentarily when jerking it higher'. The analogy will be less than apposite, however, unless the cords were held absolutely tight at the bottom as well as at the top.)

For the passive voice of ἐθίζειν used absolutely in this way cf. Xen. *On horsemanship* 3.8 (on the training of horses: μαθόντες δὲ καὶ ἐθισθέντες καὶ μελετήσαντες).

D76–83 [102.27–103.3]: alternatives to assault, 2 – treachery

D76.1–2 [*102.27–28*] **Κατὰ δὲ [τὴν] προδοσίαν** ('By treachery'). The term is taken over from D72.3 [*102.11*]; cf. also C42.1–2 [*94.10–11*] with the Comm. thereto. Ph. uses it (and describes the activities that come under its head) with no moral colouring; it is simply a neutral category of strategic options for the attackers.

For κατὰ προδοσίαν cf. e.g. Onas. 39.5 (when attacking a city by day the general should do so by surprise, 'even if he is not intending to capture it κ.π.'; 39.1 & 4 have the much commoner variant ἐκ προδοσίας) and Polyaen. 8.69: the Aitolians, at war with the Akarnanians for a long time, finally burst into 'the city' (*sic*: Stratos?) κ.π.

D76.2–3 [*102.28–29*] **ἢ μεταπεμψάμενός τινα τῶν ἔνδοθεν ὡς διαλεξόμενον περὶ διαλλαγῶν** ('Either (go about this) by sending for one of the men inside, as (if?) to have a discussion about terms (of surrender),'). For *diallagai* in this sense cf. e.g. Polyaen 5.2.7 (the besieged Dionysius II in 357 sends envoys to the Syracusans ὑπὲρ διαλλαγῶν); App.*Mac.* 3.4 = Staatsverträge 543 (envoys of Philip V and the Romans ἐπὶ διαλλαγαῖς ἀφίκοντο in 205); and see generally Y. Garlan, 'La réconciliation des ennemis dans la grèce classique', *BCH* 102 (1978) 97–108.

Quite what Ph. is envisaging here is expressed too summarily for clarity. Since the topic is treachery, it will be safe to assume that the individual τῶν ἔνδοθεν is the traitor, but how exactly is his complicity with the attackers intended to bring about the city's capture? The translation of Diels-Schramm 79, '*unter dem Vorwande*, Friedensverhandlungen anknüpfen zu wollen' (my emphasis), places great weight on Ph.'s ὡς διαλεξόμενον but then leaves the question of what takes place under the mere pretence of such diplomacy. In Garlan 324 ('pour discuter d'une réconciliation') the talks are genuine, seemingly, but there too one is left asking how the treachery manifests itself.

D76.3–5 [*102.29–31*] **ἢ δι᾽ ἐπιστολῶν ἀφανῶν κήρυκας ἢ πρεσβευτὰς εἰσπέμπων καὶ σύμβολα διδοὺς καὶ χρήματα** ('or by means of unseen messages, sending in heralds or envoys and giving (them) recognition-tokens and money'). Examples of such steganographic messages will fill D77–82 [*102.31–50*]: see the Comm. below. (Another such collection – showing no influence of Ph. – is in Front. *Strat.* 3.13.1–8.)

Without another ἤ between ἀφανῶν and κήρυκας, which would have split off 'by means of unseen messages' and 'sending in etc.' into two separate options, the idea seems to be that the secret letters will be carried in by these 'heralds or envoys' (on whom see generally e.g. D.J. Mosley, *Envoys and Diplomacy in Ancient Greece* (*Historia* Einzelschriften 22: Wiesbaden 1973); F.E. Adcock and D.J. Mosley, *Diplomacy in Ancient Greece* (London 1975) part II; and generally D.J. Bederman, *International Law in Antiquity* (Cambridge 2001) chs.4–6) rather than by other means. But are these men complicit, themselves, in the deception? That they might be is a possibility suggested in general terms by the recommendation in Aen.Tact. 10.11 that 'conversation with official embassies which come from cities or despots or armies must not be open to all comers but monitored by some of the most trustworthy citizens, who always remain with the envoys throughout their visit' (Ταῖς δὲ δημοσίαις ἀφικνουμέναις πρεσβείαις ἀπὸ πόλεων ἢ τυράννων ἢ στρατοπέδων οὐ χρὴ ἐν αὐτοῖς τὸν ἐθέλοντα διαλέγεσθαι, ἀλλ᾽ ἀεὶ παρεῖναί τινας τῶν πολιτῶν τοὺς πιστοτάτους, οἳ μετ᾽ αὐτῶν συνδιατελοῦσιν μέχρις ἂν ἐνδημῶσιν οἱ πρέσβεις). As regards what Ph. himself says, the fact that these representatives are to be given money might invite the assumption that they are party to the deceit – unless it is simply to be handed over; and the *symbola* they are carrying (P. Gauthier, *Symbola: les étrangers et la justice dans les cités grecques* (Nancy 1972), esp. parts I and III) might be ones intended for presentation, as part of their official credentials, to the city authorities, but could equally well be aimed at ensuring secure, covert liaison with other traitors inside the city.

D77.1 [*102.31*] **Γράφονται δ᾽ αἱ ἐπιστολαὶ κτλ.** ('The messages are written etc.'). The examples which now follow, in D77–82 [*102.31–50*], represent, Ph. declares at the end of them, a mere selection from the many he could have given. A full, or fuller, treatment is reserved for 'the (?)section about messages being sent secretly' (D82.3–4 [*102.49–50*]), but if that was ever written it has not survived. We are thus poorly placed to assess in full the correspondences between Ph.'s treatment of this topic and the classic one – probably already so for him – extant in ch.31 of Aeneas Tacticus. (See Whitehead, *Aineias* 183–193; Bettalli, *Enea* 302–312; and the bibliography cited in both discussions. Add now M. Debidour, 'Le secret et les messages secrets dans la *Poliorcétique* d'Énée le Tacticien', in H. Olivier et al. (ed.), *Ruses, secrets et mensonges chez les historiens grecs et latins: actes du colloque tenu les 18–19 septembre 2003* (Lyon 2005) 213–245; P. Liddel, 'Writing and other forms of communication in Aineias's *Poliorketika*', in Pretzler and Barley chap. 6.5.) In Aeneas's long and justly celebrated dossier, he illustrates both of the basic ways for keeping a secret message secret: steganography, which aims to hide its very existence, and cryptography proper, which leaves it in plain sight but unintelligible. (On this distinction see e.g. D. Kahn, *The Codebreakers: the story of secret writing* (revised and updated edn. New York 1996) 82–83.) As matters stand, Ph.'s surviving suggestions are wholly steganographic. (Plb. 8.17.4–8 is a rare instance of cryptographic communication in this era.)

Individual links, probable or possible, will be noted under the appropriate lemmata below. On the broader question of the influence of Aen.Tact. 31, via Ph., on several Byzantine treatises such as the *Sylloge tacticorum* (76.1–4), the pioneering study by J.-R. Vieillefond ('Adaptations et paraphrases du *Commentaire* d'Énée le Tacticien', *RPh*^{3} 6 (1932) 24–36, esp. 21–35) is still worth consulting; but for much more detail and scope see now P. Rance, 'The reception of Aineias Tacticus in Byzantine military literature', in Pretzler and Barley chap. 13.

D77.1–3 [*102.31–33*] **εἰς καυσίαν καινὴν <ἢ> εἰς τὸν χρῶτα κηκῖδος θλασθείσης καὶ ὕδατι βραχείσης** ('upon a new hat <or> upon the skin, with oak-gall crushed and soaked in water'). Casaubon's supplement <ἤ>, not thought necessary by Schoene, is printed by both Diels-Schramm 79 and Garlan 324.

For the 'hat', *kausia* (which will feature again, in another method, at D78.2 [*102.37*]), see C37 under **Ἔστι δὲ τὰ ὑποσυνθήματα**. The 'skin' Ph. has in mind is surely, as Diels-Schramm 79 make explicit, that of a (living) human being.

On oak-gall (a.k.a. oak-apple: excrescent growths produced on oak trees by chemicals secreted by certain wasp larvae) see LSJ s.v. κηκίς, II. Its use as a (*sc.* black) dye or stain is attested in fourth-century Athens: Demosth. 27.10 & 43. As brown-black ink – ultimately the principal kind of ink manufactured and used between late antiquity and the nineteenth century – it is not mentioned before this passage of Ph., to the best of my knowledge. See generally M. Zerdoun Bat-Yehouda, *Les encres noires au Moyen Âge* (Paris 1983) 91–92, and further under the next lemma.

D77.3–6 [*102.33–36*] **ξηρανθέντα δὲ τὰ γράμματα ἄδηλα γίνεται, χαλκοῦ δὲ ἄνθους τριφθέντος ὥσπερ ἐν ὕδατι τὸ μέλαν καὶ ἐν τούτῳ σπόγγου βραχέντος, ὅταν ἀποσπογγισθῇ τούτῳ, φανερὰ γίνεται** ('once the letters have dried they become invisible, but when flower of copper has been pounded, just like black (colouring) in water, and a sponge has been soaked in this, they become visible'). On the face of it Ph. describes here a considerably more sophisticated way of making hidden writing visible than the ones in Aen.Tact. 31.14–16, which amount merely to obliterating the ink lettering, temporarily, with a layer of whitewash or some other substance. Here in Ph. a chemical reaction is involved. His 'flower of copper' ('particles thrown off by copper when cooling': LSJ s.v. χαλκός, III) is in effect what nowadays would be called copper sulphate (cf. Garlan 324, 402 n.77*a*; 'Vitriol' (Diels-Schramm 79) is incorrect); and what Ph. suggests is that the application of this in solution renders visible the lettering that has used oak-gall ink and is now dry. More exactly, it seems, the ink itself would normally be manufactured from oak-gall and copper sulphate, but in this instance the two substances are kept distinct in two separate operations. See generally R.J. Forbes, *Studies in Ancient Technology* III (Leiden 1955) 228–231.

D78.1–4 [*102.36–39*] **ἢ εἰς ὑμένα γραφείσης, εἶτα διπλῆς οὔσης τῆς καυσίας εἰς τὸ ἀνὰ μέσον τεθείσης τῆς στεφάνης καὶ ἑτέρας <ἐπι>κολληθείσης**

('Alternatively (it can be) written onto a (?)membrane which is then placed in the upper part of a double hat, (i.e.) with (one) brim glued onto another'). Here τὸ ἀνὰ μέσον τεθείσης is Schoene's tentative emendation – not printed by him but accepted by his successors – of the transmitted τὸ ἄνω μέσης τε οὔσης. The compound <ἐπι>κολληθείσης, likewise orthodox, was proposed by Diels.

In this method, and the ones which follow in D79–81 [*102.39–47*], the concealment is not of the writing *per se* but hides the medium it is written on: cf. D77 under **Γράφονται**.

I have tentatively followed Garlan 324 in giving ὑμήν its best-attested sense, and there is no problem in assuming the ready availability of membranes of all kinds (human, animal, vegetable), which could be written on when dehydrated and flattened. (Compare, in broad terms, the bladder of D80.1–81.2 below, which Aen. Tact. 31.10 expressly instructs to be dried.) Alternatively, Diels-Schramm 79 might be right to envisage 'dünnes Pergament' here. LSJ s.v. 4 attests this sense of the word ('*parchment*') in the accounts of the origins of the Septuagint: Aristeas, *Letter to Philocrates* 176–177; Joseph. *AJ* 12.90.

On the brimmed 'hat' (*kausia*) see C37 under **Ἔστι δὲ τὰ ὑποσυνθήματα**. The noun στεφάνη in this sense is as old as Homer (*Iliad* 7.12, of a helmet): see LSJ s.v. I.1.

D79.1–2 [*102.39–40*] **ἢ ἀνὰ μέσον τῶν ὑποδημάτων τοῦ ἐμβλήματος καὶ τοῦ κασσύματος ῥαφείσης** ('or sewn in the middle of shoes, between the insole and the sole'). Here Ph. is directly indebted to Aeneas (31.4–5): 'let a man be sent bearing some message or even a letter concerning other matters which are out in the open, and when he is on the point of beginning his journey let a document be secretly inserted into the sole of his shoes, into the middle, and sewn tight; for protection against mud and water it should be written on a thin sheet of tin, so that the water does not obliterate the writing. (4a) When he reaches the required recipient and is resting during the night, the stitches of his shoes can be undone, the document removed and read, and a reply written and covertly sewn back in while he is still asleep; and he can then be sent away with a reply or even something to carry openly. (5) In this way neither the messenger himself nor anyone else will be in the know – but make sure that the stitches of the shoes are as inconspicious as possible (Πεμπέσθω ἀνὴρ ἀγγελίαν φέρων τινὰ ἢ καὶ ἐπιστολὴν περὶ ἄλλων φανερῶν· τοῦ δὲ μέλλοντος πορεύεσθαι κρυφαίως αὐτοῦ εἰς τὸ τῶν ὑποδημάτων πέλμα ἐντεθέτω εἰς τὸ μεταξὺ βυβλίον καὶ καταρραπτέσθω, πρὸς δὲ τοὺς πηλοὺς καὶ τὰ ὕδατα εἰς κασσίτερον ἐληλασμένον λεπτὸν γραφέσθω πρὸς τὸ μὴ ἀφανίζεσθαι ὑπὸ τῶν ὑδάτων τὰ γράμματα. (4a) Ἀφικομένου δὲ παρ' ὃν δεῖ, καὶ ἀναπαυομένου ἐν τῇ νυκτί, ἀναλυέτω τὰς ῥαφὰς τῶν ὑποδημάτων, καὶ ἐξελὼν καὶ ἀναγνούς, ἄλλα γράψας λάθρᾳ ἔτι καθεύδοντος καὶ ἐγκαταρράψας ἀποστελλέτω τὸν ἄνδρα, ἀνταγγείλας ἢ καὶ δούς τι φέρειν φανερῶς. (5) Οὕτως οὖν οὔτε ἄλλος οὔτε ὁ φέρων εἰδήσει· χρὴ δὲ τὰς ῥαφὰς τῶν ὑποδημάτων ὡς ἀδηλοτάτας ποιεῖν). See also, *mutatis mutandis*, Ov. *Ars Am.* 3.619–630, at 623–624 (a wife communicates with her lover via a female accomplice).

Ph.'s terminology for the parts of a shoe or sandal, as can be seen, is somewhat more elaborate than Aeneas's. My translation of ἔμβλημα as 'insole' follows LSJ

s.v., 5 (*inner sole put into the shoe in winter*, etc.), though since only the pre passage is cited for this sense it must remain a matter of supposition. The word uses, κάσσυμα, is attested with this meaning (and in its Attic form κάττυμα) f Attic Comedy onwards.

D80.1–**81**.2 [*102.40–47*] **ἢ εἰς κύστιν ὧν βούλεταί <τις> γραφέντων, εἶτα λήκυθον καινὴν σύμμετρον τῇ κύστει τεθείσης, εἶτα βρεχθείσης καὶ μετὰ τα φυσηθείσης καὶ ὑποσταλείσης <…> πρὸς τὸ ἔσω στόμα κόλλῃ καταλειφθέ καὶ ἐλαίου ἐγχυθέντος, ἵν' ἄδηλος ἡ ἐπιστολὴ γένηται, τοῦτον τὸν τρ εἰσπέμπειν· (81) ὁ γὰρ λαβὼν τὴν λήκυθον [τρόπον εἰσπέμπειν] ῥᾳδίως γνώσ τὰ γεγραμμένα** ('or what one wishes (to say can be) written on a bladder, whic then placed in a new flask commensurate with the bladder, then soaked and a wards inflated and shrunk <…> attached with glue to the inside mouth and oil po in, in order that the message becomes invisible. Send it in (to the city prepare this way; (**81**) the man who receives the flask will easily discern what has been ten'). Editors have not adopted here Rochas d'Aiglun's κενήν ('empty' flask καινήν, attractive though it is. (The transmitted εἰς λήκυθον καινήν could easily been influenced by εἰς καυσίαν καινήν in D77.1–2 [*102.31–32*]).

After ὑποσταλείσης (Buecheler ap. Schoene: the paradosis is ἀποσταλεί both Diels-Schramm 79 and Garlan 324 print the lacuna postulated by Diels, tentatively suggested filling it with <εἰς τὴν λήκυθον, τοῦ δὲ ἄκρου ἀποκοπέ καὶ> on the general model of Aen.Tact. 31.12 (below).

This, the most elaborate of Ph.'s three suggested ways of hiding the existen a written message, is again a summary of a longer – and clearer – expositio Aeneas (31.10–13): 'Here is another way of conveying (secret messages). Ta bladder equal in size to a flask large large enough for the amount of writing you w inflate and tie it off securely, dry it, and then write on it whatever you want in (ink) mixed with glue. (11) Once the lettering has dried, deflate and compres bladder and push it into the flask, with the bladder's mouth protruding from the fl mouth. (12) Then inflate the bladder to its fullest extent while it is inside the flas it with oil, cut off the part which is protruding from the flask, fit it to the flask's m as inconspicuously as possible, and put the stopper in. The flask can be carried op its contents plainly oil and, to all appearances, nothing else. (13) When it reache required recipient he empties out the oil, inflates the bladder, and reads the mes and he can wash off the words with a sponge, write his reply in the same way send it back' (Κομίζεται δὲ καὶ ὧδε. Κύστιν ἰσομεγέθη ληκύθῳ ὁπόσῃ ἂν βούλῃ τὸ πλῆθος τῶν γραφησομένων φυσήσαντα καὶ ἀποδήσαντα σφόδρα ξηρᾶναι, ἔ ἐπ' αὐτῆς γράψαι ὅ τι ἂν βούλῃ μέλανι κατακόλλῳ. (11) Ξηρανθέντων δὲ γραμμάτων ἐξελεῖν τὴν πνοὴν τῆς κύστιδος καὶ συμπιέσαντα εἰς τὴν λήκ ἐνθεῖναι· τὸ δὲ στόμα τῆς κύστιδος ὑπερεχέτω τοῦ στόματος τῆς ληκύθου. Ἔπειτα φυσήσαντα τὴν κύστιν ἐν τῇ ληκύθῳ ἐνοῦσαν, ἵνα διευρυνθῇ ὡς μάλιστ ἐλαίου ἐμπλήσαντα περιτεμεῖν τῆς κύστιδος τὸ ὑπερέχον τῆς ληκύθου προσαρμόσαι τῷ στόματι ὡς ἀδηλότατα, καὶ βύσαντα τὴν λήκυθον κομίζειν φαν Διαφανὲς τε οὖν τὸ ἔλαιον ἔσται ἐν τῇ ληκύθῳ καὶ οὐδὲν ἄλλο φανεῖται ἐνόν Ὅταν δὲ ἐλθῃ παρ' ὃν δεῖ, ἐξεράσας τὸ ἔλαιον ἀναγνώσεται φυσήσας τὴν κύστι ἐκσπογγίσας καὶ κατὰ ταὐτὰ εἰς τὴν αὐτὴν γράψας ἀποστελλέτω).

D82.3–4 [*102.49–50*] **ἐν τῷ εἴδει τῷ περὶ ἐπιστολῶν τῶν κρυφαίως ἀποστελλομένων** ('in the (?)section about messages being sent secretly'). See D77 under **Γράφονται**. For lack of a better one I have borrowed the translation of *eidos* here from Fraser, *Alexandria* 2.629 (n.479). Like him, I know of no parallel for the word in this sense. (The emendation suggested by Buecheler ap. Schoene – ἰδίῳ, 'in the separate/special (treatment thereof)' – has not been taken up.)

The phrase ἐπιστολῶν τῶν κρυφαίως ἀποστελλομένων echoes the one already used at the beginning of the sentence, τῶν κρυφαίως ἀποστελλομένων γραμμάτων (D82.1–2 [*102.47–48*]), and its adverb is especially noteworthy. Though first attested in Attic tragedy (Aesch. *Pers.* 370), it occurs most copiously in Aeneas Tacticus (18.8, 23.11, 28.5, 31.4, 32.8, 39.6) and is likely to have been taken over by Ph. from him.

D83.1–2 [*102.50–51*] **Ἐὰν δὲ μὴ καθαιρεθῶσιν ὑπὸ τῶν οὕτως πεμπομένων γραμμάτων** ('Should (the cities) not be brought down by letters being sent thus'). The transmitted verb here is καθαίρωσιν, which Schoene was content to retain, but his appendix noted suggested alternatives from Diels (καθυφῶσιν) and Buecheler (καθαιρεθῶσιν), and the second of these is printed by both Diels-Schramm 80 and Garlan 324. For καθαιρεῖν see already C14.4–5 [*91.50–51*], and cf. e.g. Septuagint *Deuteronomy* 28.52: ἕως ἂν καθαιρεθῶσιν τὰ τείχη σου τὰ ὑψηλὰ καὶ τὰ ὀχυρά. (For καθαίρειν cf. B6.2 [*86.40*]; but what it would have to mean in the present context is very hard to parallel.)

D83.2–5 [*102.51–103.3*] **ἄλλας πέμπε πρὸς τοὺς ἡγουμένους τῶν πραγμάτων ὑπισχνούμενος δωρεὰς μεγίστας καὶ χρήματα· αἳ καταφανεῖς γινόμεναι τοὺς μὲν στασιάζειν ποιήσουσιν <…>** ('send others to the leading men of affairs, promising them great rewards and money; when they come to light they will make some people seditious < …>'). Though Schoene printed this passage without a lacuna – i.e. presumably taking τοὺς μὲν στασιάζειν ποιήσουσι as answered by Κατὰ δὲ λιμόν at the beginning of the next sentence – he did ask in his apparatus whether one might be needed; and both Diels-Schramm 80 and Garlan 325 print one. (The μέν could be avoided by Brinkmann's τοὺς ἔνδον, but nobody has adopted it.) Buecheler's suggestion that what might have fallen out is καταλύεσθαι δὲ δῆμον was coloured by the fact that the paradosis of D84.1 [*103.4*], before Thévenot corrected it in the margin of the *editio princeps*, is Κατὰ δὲ δῆμον. A τοὺς δέ clause of some kind, I venture to say, would be preferable.

Polyaenus has fourth-century instances of false suspicions being created in much this sort of way: see 2.1.33 (by Agesilaus) and 5.2.18 (by Dionysius I). See also, more generally, Front. *Strat.* 3.6.7 on the capture of Troizen by the Spartan Cleonymus in the 270s, using missile-borne messages and hostile propaganda which created *seditio* (Frontinus is wrong, though, to call C. *Atheniensis*; in Polyaen. 2.29.1 he is a Spartan king; more precisely, he was pretender to the Agiad throne), and D.C. 9.40.9 on Decius Vibellius at Rhegion in c.280, forging letters purported to have been written by Pyrrhus to certain individuals ἐπὶ προδοσίᾳ.

More straightforwardly than what is described here, moves to bribe 'the leading men of affairs' in a city could of course simply be aimed at securing their compliance, and willingness to act on the attackers' behalf, without the deal coming to light beforehand. An attempt to do this is recounted in Plb. 5.60.1 on Antiochus III at Seleukeia Pieria in 219. His first step is to send messages to 'the *epistatai* of the city', proffering them money and 'a host of expectations (*sc.* of further rewards) contingent on his taking possession of Seleukeia without a fight'. (When his offers fail at that level, he then corrupts some of their subordinates, who render assistance in the military operations which are successfully undertaken: see Plb. 5.60.2–61.2.)

D84–85 [103.4–11]: alternatives to assault, 3 – starvation

D84.1 [*103.4*] **Κατὰ δὲ λιμόν** ('By starvation'). The term is taken over from D72.3 [*102.11*], and repeated at D85.3 [*103.10*]. See also B33 [*88.38–40*].

For Onas. 42.23 in this regard see D16 under **Τοὺς δ' ἀχρείους**. For instances of cities starved into submission see D85 under **λήψῃ**.

D84.1–2 [*103.4–5*] **περιχαρακώσας καὶ τόπον ἰσχυρὸν περιτειχίσας τινὰ τῇ πόλει** ('Surround (the city) with a palisade and fortify some strong place (next) to the city'). Garlan 325 prints ἐπιτειχίσας, his own emendation of the transmitted participle here, on the basis that the dative τῇ πόλει requires it: so Garlan 403 n.84*a*, referring back to his general analysis at 33–38 (*epiteichismos* and *epiteichisis*) and 108–111 (*apoteichismos* and *periteichismos*). I am not sure that Ph.'s use of prepositional phrases is precise enough to warrant a change; and either way this verb occurs only here.

On περιχαρακοῦν see D5 under **ἐὰν μέν**, and further under the next lemma.

D84.2–5 [*103.5–8*] **φύλακας ἀσφαλεῖς ἐπ' αὐτῷ κατασκευάσας, οἳ κωλύσουσι μήτε κατὰ γῆν μήτε κατὰ θάλασσαν μηδὲν εἰσκομίζεσθαι** ('establish (there) reliable guards, who will prevent anything being brought in, whether by land or by sea'). For ἀσφαλῆς in this personal sense cf. e.g. Thuc. 1.69.5 (Corinthian speakers describe the Spartans thus).

Plb. 1.18.3 describes the Romans at Akragas in 262 doing this: while their inner trench there was protection against sorties from the city, the outer one was supposed to guard against attacks from outside 'and to prevent that secret introduction of supplies and men which is usual in the case of beleaguered cities' (tr. W.R. Paton). Note also e.g. Plb. 5.73.6–7 on an (unsuccessful) attempt to smuggle food into Pednelissos.

A particularly graphic illustration of what Ph. outlines in D84–85 [*103.4–11*] as a whole – excepting only the separate 'strong place' – is provided by Diod.Sic. 19.49.1–3 on Cassander at Pydna (where Olympias had taken refuge) in 316: 'by encamping round the city and erecting a palisade from sea to sea (χάρακα βαλόμενος ἀπὸ θαλάσσης εἰς θάλασσαν) and blockading the harbour he sought to prevent anyone who wanted to bring assistance from doing so. With the supplies swiftly used up, he created so great a dearth amongst those inside as to incapacitate them completely: such was the extent of their need that the soldiers received an allowance of (only) five choinikes of grain per month, the confined elephants were fed beams in

the form of sawdust, and the pack-animals and horses were chopped up for nourishment. While the situation of the city was so grave and Olympias was still clinging to hopes of rescue from outside, the elephants perished from lack of food, the horsemen who were outside the ranks and not receiving a grain-allowance nearly all died, and many of the soldiers met the same fate'. (By the following spring the blockade had done its work: troops deserted to Cassander and he took possession of the city.)

D85.2–4 [*103.9–11*] **λήψῃ τὴν πόλιν ἢ τῷ πολέμῳ κατορθώσας ἢ ἐκθλίψας λιμῷ, καὶ οὐθὲν καθυστερήσεις τῶν πράξεων** ('you should take the city either after military success or after squeezing it out by starvation, and you will not fall short at all in your endeavours'). With τῷ πολέμῳ κατορθώσας cf. Plb. 29.9.10 (on the advantage for Perseus in Eumenes II becoming an enemy of Rome): πόσου δὲ τοῦτ' ἄξιον Περσεῖ καὶ κατορθοῦντι τῷ πολέμῳ καὶ πταίοντι, ῥᾴδιον συλλογίσασθαι; there however 'the war' is a specific one (the Third Macedonian), not Ph.'s generic one. For κατορθοῦν in military senses see also e.g. Thuc. 6.11.1, 7.42.5; Xen. *Mem.* 3.1.3; Plb. 2.70.6, 3.48.2, 11.3.1; Onas. 27.1; App. *BC* 5.121.

Instances of cities brought to their knees by starvation include Thasos in 462 (Polyaen. 2.33.1), Poteidaia in 430/29 (Thuc. 2.70.1), Mytilene (Thuc. 3.27.1) and Plataiai (Thuc. 3.52.1, etc.) in 427, Akragas in 406 (Xen. *Hell.* 1.5.21), Athens in 405/4 (Xen. *Hell.* 2.2.1–23, etc.), Rhegion in 388 (Diod.Sic. 14.108.1–2 and 111.1–4), Olynthos in 379 (Xen. *Hell.* 5.3.26), Tyre in 314 (Diod.Sic. 19.61.5), Athens again in 295 (Plut. *Demetr.* 33.6–34.3), Casilinum in 216 (Liv. 23.19.1–16, Strab. 5.4.10, Front. *Strat.* 3.15.3), Petelia (Plb. 7.1.3, etc.: refs. HCP 1.30–31) in 215, Numantia in 133 (App. *Iber.* 412–427), Athens yet again in 86 (App. *Mith.* 147, cf. Plut. *Sull.* 12.2), and Perusia in 41 (D.C. 48.14.1–3, cf. App. *BC* 5.33–49). At Akragas in 262, besieged and besiegers alike – the Carthaginians and the Romans respectively – ran short of food in a stalemate of five-six months, before an eventual battle led to the city's abandonment (Plb. 1.17.7–19.5). Rhodes, when menaced by the tyrannicide C.Cassius Longinus in 43, was held to be so unprepared for a siege that it would rapidly succumb ἢ χερσὶν ἢ λιμῷ (App. *BC* 4.72; it was actually taken by a combination of treachery and surprise). In the seven-month siege of Jerusalem in 70 CE, the Romans eventually prevailed through a combination of military force and the effects (so luridly described in Joseph. *BJ* 5.512–518, 567–571) of hunger. (For some instances of capitulation induced by lack of *water* see D8 under **τὰ ὕδατα**.)

The verb ἐκθλίβειν is one Ph. has already used in *Bel.* 61.40, though in a purely literal sense there (of catapult sinews and an oil-bath). I know of no parallel for its rather ghoulish meaning in the present passage, but for simple θλίβειν see Diod.Sic. 20.31.3: in 309 the belligerent Akragantines see that the Syracusans are θλιβομένους τῇ σιτοδείᾳ. (In a military context elsewhere ἐκθλίβειν is applied to overly tight formations of troops: so e.g. Xen. *Anab.* 3.4.19, Diod.Sic. 20.64.4, Onas. 6.2.) The same idea could of course be expressed by other vocabulary, such as πιέζειν (a verb Ph. has used in a literal way in C9.3 [*91.30*]): so e.g. Diod.Sic. 12.55.7 on Mytilene (above), τῇ σιτοδείᾳ καὶ τῷ πολέμῳ πιεζόμενοι, and cf. again Onas. 42.23.

For the verb καθυστερεῖν cf. already *Bel.* 50.3, of artillery literally falling short, and 58.3, of 'delay' (Marsden) brought about by a design feature. My translation here is an attempt to encompass both of its attested senses: delay (cf. Diels-Schramm 80, 'ohne dass Du dadurch etwas … verzögerst'; Garlan 325, 'sans éprouver le moindre retard') and simple failure. As to the syntax, it might be possible to argue that οὐθὲν … τῶν πράξεων is the direct object of the verb; however, as it is a verb which elsewhere, when it is not used absolutely, routinely takes the genitive, I agree with LSJ s.v. 3 (*contra*, apparently, Arnim, *Index* 39) that that is so here too, with οὐθέν used adverbially.

D86–100 [103.12–51]: responding to the arrival of enemy reinforcements by land

D86.1–3 [*103.12–14*] **Ἐὰν δὲ βοήθειάν τινα προσδέχῃ παρασκευάσασθαι τοῖς ἐναντίοις, ἐὰν μὲν καταδεεστέραν δύναμιν ἔχῃς, κτλ** ('(What to do) if you expect that some reinforcements have been prepared for your opponents. If your force is weaker, etc'). This, the first of the two subsets of the topic, fills D86–87 [*103.12–19*]; at much greater length, D88–100 [*103.19–51*] then turn to suitable terrestrial strategy and tactics if the besieging force is equal or superior; and D101–110 [*104.1–40*] address the same scenario at sea.

D86.3–5 [*103.14–16*] **διάλυσαι τὴν ταχίστην ἐὰν βούλωνται χρήματα λαβὼν ὡς ὅτι πλεῖστα ἀναζευγνύων πρὸς τὸ πλησιάσαι τοὺς πολεμίους** ('come to terms as quickly as possible, if they are willing, taking as much money as you can (and) breaking camp in the face of the approaching enemy'). The first and principal of these recommendations is plain enough (on absolute διαλύειν – as opposed to δ. τὸν πόλεμον or the like – in this sense, see LSJ s.v., under 4.b), with the money in question presumably to be paid under the terms of the agreement reached (rather than simply appropriated); and see further under the next lemma. Reaching agreement 'as quickly as possible' then links with the desirability of a swift withdrawal. (I find attractions in Thévenot's reported πρὸ τοῦ πλησιάσαι, but nobody has adopted it.)

For ἀναζευγνύειν without στρατόπεδον explicit, see e.g. Thuc. 8.108.3, Xen. *Anab.* 3.4.37, and ubiquitously in Hellenistic historiography.

D87.1–4 [*103.16–19*] **ἐὰν δὲ μὴ διδῶσιν, λεηλατήσας καὶ κακώσας τὴν χώραν αὐτῶν ἀπαλλάτου πρόνοιαν ποιούμενος, ὅπως ἀσφαλῶς ἀπάξεις τὸ στρατόπεδον** ('if they do not offer (terms), withdraw after pillaging and maltreating their territory, giving thought to moving the army away securely'). As Garlan 403 n.87*a* observes, it can be assumed that *not* behaving in this way would have been one of the undertakings, on the besiegers' side, enshrined in the agreement of D86.3–4 [*103.14–15*]. Without it, here, they are free to indulge in the sort of behaviour that D6.5–7.4 [*96.46–97.1*] has restrained.

The notion of maltreatment (κακοῦν) is a broad one which Ph. will happily apply to humans in another context (D105.3 [*104.23*]); but the verb associated with it here is more specialized. For λεηλατεῖν cf. e.g. Xen. *Hell.* 2.4.4, 4.4.15, 4.8.30; Plb. 2.6.5, 4.26.4, 30.11.2; Diod.Sic. 11.52.2 and *passim* (often with τὴν χώραν, as here; see also Polyaen. 3.11.10 and 5.44.5). In ch.16 of Aeneas Tacticus, defenders of a city are advised to play a waiting game while invaders grow over-confident ἐπὶ λεηλάτησιν

(16.5); 'it is sometimes profitable to sit back and let enemies devastate as much of the territory as they like – the aim being, of course, that while they are pillaging (λεηλατοῦντες) and are encumbered with spoils, you can easily make them pay the penalty' 16.8); and if τὰ ἐκ τῆς χώρας λεηλατηθέντα have already gone, they can still be retrieved (16.11–12). W. K. Pritchett's two studies of 'Vocabulary for booty' (*War* 1.54–58, much expanded in 5.73–152) focus on nouns rather than verbs, but as regards λεηλατεῖν the relevant noun is λεία, on which see D61 under **Πειρῶ**. Given Pritchett's general conclusion that 'λεία, from Herodotus on, is a general word for booty, but is frequently applied to livestock, cattle' (*War* 5.86), I have differentiated it in translation from διαρπαγή ('plundering'), even though one cannot be certain that Ph. himself consciously intended a substantive distinction.

D88.1–3 [*103.19–21*] **Ἐὰν δὲ παραπλησίαν ἢ κρείττω δύναμιν ἔχῃς καὶ κατὰ γῆν προσδέχῃ τοὺς πολεμίους, κτλ.** ('If on the other hand your force is comparable or superior and you are expecting the enemy (to be augmented) by land, etc.'). This topic fills D88–100 [*103.19–51*].

D88.3–5 [*103.21–23*] **τῇ χαρακώσει καὶ τῇ τάφρῳ καὶ τῇ τειχοποιίᾳ πάντοθεν ὡς ἀσφαλέστατα παρασκευσάμενος ὑπόμενε** ('make the most secure preparations you can, overall, with the palisading and the trench and the fortification-system and stand firm'). The camp's palisade has already been mentioned at D6.2–4 [*96.43–45*] and its (double) trench at D10.2–4 [*97.20–22*]. The latter passage's parapet may be what is meant here by the vague addition 'and the *teichopoiia*' (unless it is interpolated?). In any event, D89.1–2 [*103.25–26*] can hardly be a careless repetition of this but must, rather, be a restatement in order of execution.

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(16.5); 'it is sometimes profitable to sit back and let enemies devastate as much of the territory as they like – the aim being, of course, that while they are pillaging (λεηλατοῦντες) and are encumbered with spoils, you can easily make them pay the penalty' 16.8); and if τὰ ἐκ τῆς χώρας λεηλατηθέντα have already gone, they can still be retrieved (16.11–12). W.K. Pritchett's two studies of 'Vocabulary for booty' (*War* 1.54–58, much expanded in 5.73–152) focus on nouns rather than verbs, but as regards λεηλατεῖν the relevant noun is λεία, on which see D61 under **Πειρῶ**. Given Pritchett's general conclusion that 'λεία, from Herodotus on, is a general word for booty, but is frequently applied to livestock, cattle' (*War* 5.86), I have differentiated it in translation from διαρπαγή ('plundering'), even though one cannot be certain that Ph. himself consciously intended a substantive distinction.

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D95.1–3 [*103.37–39*] **κατασκόπους ἀπόστελλε βελτίστους καὶ ἔμφρονας, ἵνα μὴ λάθωσι παρελθόντες τινὲς <τὸ> τῶν ἐναντίων πλῆθος ἐγγίσαν** ('send out your best and (most) intelligent men as observers, in order that individuals arriving sooner than the mass of the opponents which has approached do not escape notice'). As Pritchett (see under the preceding lemma) 130 establishes, the defining characteristic of *kataskopoi* ('informateurs': Garlan 525), differentiating them from *skopoi*, is that they are itinerant; cf. Garlan 403 n.95*a*.

The sort of men Ph. wants for this role call to mind the type recommended as gatekeepers by Aen.Tact. 5.1: πυλωροὺς καθεστάναι … φρονίμους καὶ ἀγχίνους.

Though the ἵνα clause is printed as transmitted (with only the addition of Diels's <τό>) by both Diels-Schramm 82 and Garlan 326, what it means is not immediately clear. The translation in Garlan ('afin d'être renseigné sur la présence d'éléments isolés aussi bien que sur l'approche de la masse des ennemis') is rather too loose. Diels-Schramm do better with 'damit nicht vereinzelte feindliche Soldaten, die der sich nähernden Truppenmasse vorauseilen, unentdeckt bleiben'; this, in conjunction with Arnim's classification (*Index* 61) of παρελθόντες here as transitive, leads to the conclusion that its object is <τὸ> τῶν ἐναντίων πλῆθος ἐγγίσαν and that the object of λάθωσι is implicit. (Schoene suggested supplying λάθωσί <σε>; cf. D102.2 [*104.7*].) If one wanted a speculative alternative to the sense thereby produced, it is available in λάθωσι <(καί?) ἀγγέλλοντες τὸ τῶν βοηθούντων> πλῆθος (Brinkmann ap. Schoene).

D96.1–4 [*103.39–42*] **Καὶ πειρῶ πρῶτον τοὺς στρατηγοὺς ἢ τοὺς ἡγεμόνας φθεῖραι χρήματα διδοὺς καὶ δωρεὰς ὑπισχνούμενος** ('Try too, at the outset, to corrupt the (enemy) generals or commanders by giving money and promising rewards'). Cf. already D83 [*102.50–103.3*], for taking this approach to the city's political leaders. Now Ph. presents it as even more likely to be efficacious with the military leadership of the city's notional allies. (For φθείρειν in this sense see LSJ s.v., I.3.) See further under the next lemma.

D97.1–2 [*103.42–43*] **οὕτως γὰρ ἐὰν κρίνῃ, γίνεται νικᾶν καὶ οὐδέν ἐστιν ἕτερον στρατήγημα τοιοῦτον** ('for if you decide (to act) thus, victory can occur and there is no other stratagem like it'). Though the transmitted ἐὰν κρίνῃ has been questioned in the past (Buecheler ap. Schoene suggested ἐν εἰρήνῃ, 'in peace(-time)'; Diels ap. Schoene a tentative ἀκονιτί, 'effortlessly'), all editors are content to print it. There is a good parallel (albeit active voice rather than Ph.'s middle) in Athen. Mech. 39.7–8, Διόπερ, ἐὰν κρίνῃς, ἐσχηματγραφημένα πάντα ἔσται τὰ μηχανήματα.

The idiom of γίγνεσθαι with an infinitive is rare, but cf. Theognis 639–640 (Πολλάκι πὰρ δόξαν τε καὶ ἐλπίδα γίνεται εὖ ῥεῖν | ἔργ' ἀνδρῶν); there the verb has the sense 'it is possible' (LSJ s.v.) and I have construed it likewise here.

This is Ph.'s sole use of the noun στρατήγημα. Compare generally Polyaen. 5 pref.: ὅπως οὖν ζηλώσετε τὰς τῶν ἀρχαίων ἀρετὰς καὶ νίκας, αὐτὰ δείξει τὰ στρατηγήματα.

D98.1–3 [*103.43–45*] **τὰ χρήματα ἐκ τῶν πολιορκουμένων ἔσται τῆς πόλε ληφθείσης** ('the money will be (recoverable) from the besieged once the city h been taken'). On such plundering see already D65 [*101.28–30*].

D99.1–6 [*103.45–50*] **Ἐὰν δὲ μὴ δύνῃ δεκάσαι τοὺς ἡγουμένους τοῦ στρατοπέδ ἐνέδρας κατασκευάσας ἢ τόπους ἐπιτηδείους προκαταλαβόμενος ἐπίθ καταστρατοπεδεύουσιν αὐτοῖς νυκτὸς πρὸ τοῦ <δίδοσθαι> τάφρου ἐπιλάβεσθ <ἢ> χάρακα θέσθαι τοῖς βοηθοῦσιν** ('If you are not able to bribe those who are command of the (reinforcing) army, prepare ambushes or capture suitable places advance and make a night attack on them while they are pitching camp, before < opportunity is given> to the reinforcing (troops) to put in a trench <or> to position palisade'). The aorist infinitive δεκάσαι was one of Emmanuel Miller's now-sta dard emendations [see A15 under **ἀπὸ τῶν**], here for the transmitted δεκάτας δεκάσας. (On the verb see F.D. Harvey, '*Dona ferentes*: some aspects of bribery Greek politics', in P.A. Cartledge and F.D. Harvey (eds.), *Crux: essays presented G.E.M de Ste. Croix on his 75th birthday* (Exeter 1985) 76–117, at 88–89. Its etym logical connection with the number ten, convincingly established there in respect Athenian juries, has of course no bearing on a passage like Ph.'s.)

The supplement <δίδοσθαι> (Diels) is printed in both Diels-Schramm 82 a Garlan 326, as is <ἤ>. (Schoene saw no need for a conjunction between the t infinitives. Brinkmann ap. Schoene preferred <καί>, and also suggested ot changes: περιλάβεσθαι for ἐπι-, and the deletion of τοῖς βοηθοῦσιν as an intrus gloss on the preceding line's αὐτοῖς. Buecheler ap. Schoene proposed emend χάρακα θέσθαι τοῖς into παρακαθῆσθαί τε οἷς, 'and to encamp beside the reinfo ing (troops)'.)

With ἐνέδρας κατασκευάσας cf. ἐνέδραν κατασκευάσας at D61.8 [*101.18*]. capturing suitable strong points in advance cf. e.g. Polyaen. 3.9.43 (Iphicrates Corinth in 391).

The sort of opportunistic attack envisaged by Ph. in ἐπίθου κα στρατοπεδεύουσιν αὐτοῖς νυκτός is exemplified in Plb. 11.21.1 (cf. Liv. 28.13 on Mago vs the Romans in Iberia in 206: Μάγων δὲ νομίσας εὐφυῆ καιρὸν ἐπιθέσ καταστρατοπεδεύουσι τοῖς Ῥωμαίοις, ἀναλαβὼν κτλ. See also e.g. Arr. *Anab.* 1. (Alexander vs. the Triballians in 335: καταλαμβάνει καταστρατοπεδεύοντας ἤδ

D100.1–2 [*103.50–51*] **οὗτοι γὰρ οἱ καιροὶ τοὺς ἀντιπάλους χειροῦνται** (these are the circumstances in which one's adversaries come off worse'). P Greek, with οἱ καιροί as subject of χειροῦνται and τοὺς ἀντιπάλους (here only, a variant of his usual πολεμίους or ἐναντίους) as object, is more direct than it naturally be made to sound in translation; cf. 'ce sont en effet les meilleures circ stances pour vaincre les opposants' (Garlan 326). Diels-Schramm 82 does rep duce the idiom more closely, with 'denn günstige Umstande überwältigen Gegner'.

D101–110 [104.1–40]: responding to the arrival of enemy reinforcements by sea

D101.1–2 [*104.1–2*] **Ἐὰν δὲ κατὰ θάλασσαν μέλλῃς διακινδυνεύειν, χῶσον ἐὰν ᾖ δυνατὸν τὸ στόμα τοῦ λιμένος** ('If, though, you are likely to be engaging in combat (with reinforcements who arrive) by sea, fill in the mouth of the harbour, if it is possible'). My parenthesis in the first translated clause brings out the implicit context of this section (cf. the rubric in W.M. Murray, *Age of Titans* 299: 'What to do if a relieving force arrives'); οἱ βοηθοῦντες, in any case, are mentioned at D102.2 [*104.7*].

The importance Ph. attaches to closing off access to harbours can be judged from the fact that this is the third appearance of the topic: cf. C52–58 [*94.40–95.20*], from the defence side, and briefly at D5.4–5 [*96.40–41*]. Here the primary method advocated seems to be less elaborate than the equivalent ones enjoined on the defenders – simply filling the harbour-mouth (W.M. Murray, *Age of Titans* 299 adds 'with rocks and earth'). Failing even that, it is to be blocked off with a ship-based barrier: see under the next lemma.

D101.3–6 [*104.3–6*] **φράξον ταῖς ὁλκάσιν <ἢ> ὅσοις ἂν ἔχῃς ἐπιτηδείοις πρὸς ταῦτα πλοίοις, καὶ παράζευξον σχεδίαν ἐκ τῶν ὑπαρχόντων ξύλων κατασκευάσας** ('close it with your cargo-vessels <or> whatever boats you may have that are suitable for this, and lash together a raft which you have prepared out of available timbers'). This construction, while inviting comparison with the one described in C54 [*94.49–95.5*], sounds much less complicated. The term 'raft' (σχεδία), employed figuratively at D11.3–5 [*97.32–34*], can be taken literally here (and again at D103.11 [*104.19*]).

D102.1–4 [*104.6–9*] **τήρει τοὺς φρυκτοὺς μάλιστα τῆς νυκτός, μή σε λάθωσιν οἱ βοηθοῦντες κατὰ τὸ ἐκτὸς τῆς θαλάσσης μέρος τῆς πόλεως παρεμπεσόντες** ('keep particular watch on the beacons at night, in case the reinforcers surprise you by mounting an attack on the seaward part of the city'). Long-standing emendations of the paradosis are (rightly) orthodox here: Rochas d'Aiglun's φρυκτούς for φρακτούς, Haase's λάθωσιν for λάβωσιν.

On beacons cf. e.g. Aen.Tact. 7.4 (with Whitehead, *Aineias* 113; Bettalli, *Enea* 229–231), where he refers to a full treatment in his (now lost) *Preparations*.

D103.1–2 [*104.9–10*] **Ἐὰν δὲ τύχῃς ἔχων μικρῷ καταδεεστέραν δύναμιν ναυτικήν, κτλ** ('Should you happen to have a naval force only slightly inferior (to theirs), etc.'). For this form of words cf. D86.2–3 [*103.13–14*], ἐὰν μὲν καταδεεστέραν [Haase, emending καταδυναστέραν] δύναμιν ἔχῃς.

W.M. Murray, *Age of Titans* 299 n.48 comments that '[i]f the relieving force was significantly weaker than the besieging force, it would not attempt to relieve the siege. Such a case can be seen in 298 when Lysimachus came to break Demetrius's siege of Cilician Soloi, but had to back down in the face of his enemy's superior force (Plut. *Demetr.* 20.8–9)'.

D103.2–6 [*104.10–14*] **ἐπὶ τὰ καταστρώματα λαβόντα τοὺς ἀρίστους καὶ ἐμπειροτάτους τῶν στρατιωτῶν, παραγγείλαντα μήτε ἀκρωτηριάζειν μήτε ἀναβαίνειν ἐπὶ πολεμίαν ναῦν μηδεμίαν, ἀλλὰ τῷ χαλκώματι χρᾶσθαι** ('put on the decks the best and most experienced of your troops, and give orders forbidding (?)using the stern-post or boarding an enemy warship; instead, (allow only) the use of the bronze (ram)'). For καταστρώματα (Haase's standard correction of the transmitted κάτω στρώματα) see generally LSJ s.v. I; Casson, *Ships* 145–146. (W.M. Murray, *Age of Titans* 299 with 300 n.49 translates 'fighting decks'.) Troops with great experience in amphibious operations of this kind have already been recommended at D22.3–5 [*98.29–31*].

As regards the battle-orders, negative and positive, that they are given here, the prohibition on boarding any enemy warship is self-explanatory; and the use of the *chalkôma* – literally, the bronze item – is elucidated by parallels (e.g. IG ii^2 1606.32 & 89, with Casson, *Ships* 85 n.43; Diod.Sic. 20.9.2, 20.15.1–2; Plut. *Them.* 14.4, *Ant.* 67.3) which do confirm that a warship's beak or ram is meant; cf. Garlan 403 n.103*c*; W.M. Murray, *Age of Titans* 300 n.51. That leaves as the only obscurity here the operation – also prohibited – to which Ph. applies the verb ἀκρωτηριάζειν. Diels-Schramm 82–83 translate it 'den Bug ['bow'] abzuhauen'; Garlan 326 more vaguely as 'désarmer', with a note (Garlan 403 n.103*b*) briefly referring to the *diekplous* manoeuvre which 'consistait à arracher au passage les rames du bateau ennemi'. (The nature and purpose of the *diekplous*, which Garlan invokes again at 404 n.109*a*, are in fact controversial matters: see the references and summary discussion in Hornblower, *Commentary* 1.92 with 3.614.) W.M. Murray, *Age of Titans* 300 with n.50 (anticipated at 139 n.30) takes a significantly different tack, translating ἀκρωτηριάζειν as 'to climb out'. While conceding that the cluster of senses registered by LSJ s.v. all involve amputation of some kind, his view is that '[h]ere, the meaning must be something like "to climb out on an extremity" (as you would when collecting an enemy prow or stern ornament) or "to make an *akroterion* of yourself". Although LSJ does not report this particular meaning of the verb, its general sense comes from what follows: "order the men … not to board any enemy ship".' Murray's fundamental point seems to me persuasive – because, in context here, both ἀκρωτηριάζειν and boarding an enemy vessel appear to be things that *individual marines* are not to do – but perhaps climbing out of one's own ship is insufficiently different from climbing on board another. My tentative alternative seeks to enlarge that differentiation. (On a ship's ἀκρωτήριον see generally Casson, *Ships* 86.)

D103.6–11 [*104.14–19*] **ναυμαχητέον ἐστὶ πρὸς αὐτούς, ποιήσαντα μηνοειδὲς σχῆμα καὶ τὰς ἐπίπλους καὶ τὰς εὐπροσόδους καὶ τὰς ἄριστα πλεούσας τῶν νεῶν ἐπὶ τὰ κέρατα τάξαντα, τὰ δὲ ἄφρακτα καὶ τὰ ὑπηρετικὰ εἰς μέσον πρὸς τῇ σχεδίᾳ** ('A sea-battle should be fought against them when you have formed (your fleet into) a crescent shape and have drawn up the attacking and most manoeuvrable and best-sailing of your ships on the wings, with the undecked and support vessels in the centre by the raft'). Diels-Schramm 83 fig.32 offer a sketch of this formation. As Garlan 403 n.103*d* observes, it was in essence not at all original. (See imprimis Hdt. 8.16.1 on the Persian fleet at Artemisium; also e.g. Polyaen.

3.10.13 & 17 (Timotheus). For the equivalent terrestrial formation cf. e.g. Xen. *Anab.* 5.2.13, Diod.Sic. 15.55.3, Plb. 3.113.8 and 3.115.7.)

For 'attacking' ships (see generally LSJ s.v. ἐπίπλοος (A)) cf. Plb. 1.27.5, 1.50.6. The active sense of εὐπρόσοδος here – good at effecting approaches, rather than easily-approached – seems to be unparalleled; cf. LSJ s.v. II.

'Undecked' vessels are the generic opposite of the *kataphraktoi* of D22.2 [*98.28*]; cf. Garlan 404 n.103*e*. The raft: see already D101.4–6 [*104.4–6*].

D104.1–3 [*104.19–21*] **Εἶθ' ὅταν ἐγγίσωσι, τοῖς πυροφόροις καὶ τοῖς ἡμμένοις τριβόλοις καὶ ταῖς λαμπάσι καὶ τῇ πίσσῃ ἅπτε ἐὰν ἔχῃς** ('Then when (the enemy ships) come close, set them alight with incendiaries and flaming *triboloi* and torches and pitch, if you have (them)'). As transmitted, the words καὶ ταῖς λαμπάσι follow καὶ τοῖς λιθοβόλοις at the beginning of the next section (D105.1 [*104.21*]: see the next lemma). Schoene retained the paradosis but, in his apparatus, wondered whether the phrase would be better placed here. Both Diels-Schramm 83 and Garlan 326 implement the transposition, surely rightly.

The phrase 'if you have (them)', if it is anything more than padding, perhaps reflects the fact that these items have hitherto been mentioned only on the defenders' side; nevertheless, it is scarcely conceivable that the attackers, too, did not have them, or could readily acquire them. (On *triboloi* see generally A79 under **οἱ τρίβολοι**.)

D105.1–6 [*104.21–26*] **καὶ τοῖς λιθοβόλοις καὶ τοῖς ὀξυβελέσι καὶ τοῖς ἄλλοις βέλεσιν ὡς πλείστοις χρώμενον κακοῦν δεῖ τοὺς ἐπιβάτας καὶ συντρίβειν καὶ ἐμπιπράναι τὰ τῶν ἐναντίων σκάφη τύπτοντα ἐκ τῆς γῆς καὶ ἀπὸ τῶν μηχανημάτων καὶ ἀπὸ τῶν ἄλλων πλοίων** ('it is also necessary to use stone-projectors and bolt-firers and other artillery, as many as possible, to maltreat the(ir) marines and to crush and burn the enemies' craft by striking them (with projectiles fired) out of the land(ward side) – from the machines – and from the other boats'). The words ἐκ τῆς γῆς καὶ ἀπὸ τῶν μηχανημάτων καὶ ἀπὸ τῶν ἄλλων πλοίων do not seem to stand up to close logical scrutiny as they stand (and as translated by W.M. Murray, *Age of Titans* 300: 'striking them from the land and from the timber constructions and from the other boats'). The opening ἐκ τῆς γῆς is unproblematic enough, but is it followed by *two* more alternatives, each introduced by a καί, or is ἀπὸ τῶν μηχανημάτων an expansion/explanation of ἐκ τῆς γῆς, i.e. with ἐκ τῆς γῆς and ἀπὸ τῶν ἄλλων πλοίων the only two tactics mentioned? Is there in any case a καί too many here, such that the first element should be ἐκ τῆς γῆς [καὶ] ἀπὸ τῶν μηχανημάτων? Diels-Schramm 83 has 'durch Schüsse vom Lande aus, von den Maschinen und anderen Fahrzeugen': there the single comma evades the issue of the double καί. (Garlan 327 muddies the waters still further, with 'en les frappant depuis le rivage, les ouvrages de charpente et les autres vaisseaux'; is *avec*, or something of the kind, missing there?) I do not feel entitled to delete the καί, which in Greek usage, arguably, is needed as separation between the two prepositional phrases; but I do think it very probable that, in sense, ἐκ τῆς γῆς and ἀπὸ τῶν μηχανημάτων belong together.

A subsidiary issue is presented by the phrase 'the other boats'. If Ph. means 'other' than the fast attacking vessels stationed on the wings at D103.8–10 [*104.16–18*], they are likely to be the ones differentiated from them there, which occupy the central part of the crescent: the ἄφρακτα and ὑπηρετικά. (If he means a category or categories of vessel different from even those, he has failed to make himself clear.)

Ph.'s recognition of the role played by artillery ἐν ταῖς ναυτικαῖς had been acknowledged in passing at *Bel.* 58.4–5 (and 72.17–18). On the topic in general see Marsden, *Development* 169–173; W.M. Murray, *Age of Titans* 145–170 and Appendix F.

D106.1–3 [*104.28–30*] **Ἐὰν δὲ ὑπομένωσιν, ἔξω τὸν κίνδυνον ἀπὸ ἀμφοτέρων ποιούμενον τῶν κεράτων συναγαγόντα** ('If they bide their time, (you must) bring together (your forces) from both wings and conduct the combat outside (the immediate vicinity?)'). On ὑπομένειν in this (sort of) sense see D88 under **τῇ χαρακώσει**.

Orthodoxy follows Buecheler ap. Schoene in holding that the Ἐάν clause does end at ὑπομένωσιν (rather than associating the adverb ἔξω with that verb), and also in emending the transmitted ποιουμένους/ποιούμενος to this ποιούμενον. Understood and adjusted thus (and with an implicit 'you must' *vel sim.* governing the two participles, present and aorist), all translators are agreed on the sense of ἀπὸ ἀμφοτέρων … τῶν κεράτων συναγαγόντα: 'nachdem Du von beiden Flügeln zusammengeschlossen hast' (Diels-Schramm 82); 'à partir de chacun des ailes, se rabattre vers le centre' (Garlan 327); 'gathering together your force from both wings' (W.M. Murray, *Age of Titans* 300). That leaves ἔξω τὸν κίνδυνον … ποιούμενον as the obscure part of Ph.'s recommendation. To my mind Murray's 'take the combat forward' evades the connotations of ἔξω. Diels-Schramm ('ausserhalb den Kampf wegen') and Garlan ('mener le combat à l'extérieur') translate it; I have followed suit, and given an indication of what 'outside' is likely to mean.

D107.1–4 [*104.30–33*] **Ναυμαχητέον οὕτως ἐστίν· τὰς μὲν πλαγίας λαμβάνων καταδύσεις, τὰς δὲ ἀντιπρώρους κινδυνευούσας συντρίψεις καὶ ἐμπρήσεις, καθάπερ εἴρηται** ('This is how to fight a sea-battle: you will sink some (of their ships) by taking them from the side; others, faced head-on, you will crush and burn, just as has been stated'). In D104–105 [*104.19–28*], as regards τὰς δέ κτλ.

Transitive καταδύνειν, again at D108.4 [*104.36*], means causing ships to 'sink' not necessarily in the literal sense of sending them to the bottom – what Thuc. 7.34.5 calls sink outright (ἁπλῶς), and 8.42.3 conveys by differentiating between κατέδυσαν and κατετραυμάτισαν (cf. κατέδυσε vs. ἅπλους ἐποίησε in Diod.Sic. 12.48.1 and Polyaen. 3.10.12) – but reducing them to a disabled, waterlogged state: see LSJ s.v. under II.1, and HCT 1.185 (citing Thomas Arnold) on Thuc. 1.50.1. In A76.8 [*85.29*] Ph. had used the verb intransitively, of tortoises and 'machines' sinking down into unstable ground (but there too, surely, not disappearing from sight).

Though Arnim, *Index* 5 registers this as an instance of ἀντίπρωρος – more properly ἀντίπρῳρος – in sense 2 (*face to face*) of LSJ s.v., there is in truth little difference, in a case like this, from sense 1 (*with the prow towards*); cf. e.g. Thuc. 8.53.2, Xen. *Hell.* 6.2.28, Diod.Sic. 12.61.3, Plut. *Them.* 14.3 and *Lys.* 10.2, Arr. *Anab.* 1.19.3 & 10, Polyaen. 1.40.9, 1.48.2, 3.10.17.

D108.1–3 [*104.33–35*] **ἐὰν δὲ λάβῃς ἀτάκτως φερομένας ἢ ἱστιοδρομούσας, ἐπιπλεύσας ἐν τάξει παντὶ τῷ στόλῳ** ('If you encounter any that are out of posi-

tion or proceeding under full sail, attack in formation (and) in full force'). Diels-Schramm 84 fig.33 is a (not altogether enlightening) depiction of this.

For the rare verb ἱστιοδρομεῖν cf., chiefly, Plb 1.60.9: at Lilybaeum in 241 C. Lutatius Catulus prepares for battle with the Carthaginians when he sees their ships under full sail (τὰς τῶν πολεμίων ναῦς ἱστιοδρομούσας). In that instance the sails are the means of propulsion *towards* a battle-site (where they and their associated gear would usually be stowed away: Casson, *Ships* 235–236). The implication here in Ph.'s scenario may well be that these vessels are sailing *away*, and some translators indeed make this explicit ('mit vollen Segeln abfahren', Diels-Schramm 84; 'fleeing under sail', W. M. Murray, *Age of Titans* 301); if so, however, what follows allows for some of them deciding to stop and make a fight of it. (In my opinion Murray's translation of τὰς μὲν ἀμυνομένας at D108.3 [*104.35*] as 'when they are defending against you' distorts the distinction between that phrase and τὰς δὲ φευγούσας at D109.1–2 [*104.36–37*]. Some ships are doing one thing, others another.)

D108.4 [*104.46*] **καταδύνειν καὶ καταπιμπράναι** ('to sink and to burn down'). The two infinitives might more logically be connected by 'or' than the transmitted 'and'; either that or else they would be better reversed. In any event, for καταδύνειν see already D107 under **Ναυμαχητέον**. For καταπιμπράναι, here only in Ph., cf. Plb. 14.4.10 and quite frequently in later historiography in accounts of cities and other terrestrial entities being burned to ashes. (I know of no instance which parallels Ph.'s application of it to the burning of warships, where, rather, the compound of choice from the *Iliad* onwards appears to be ἐμπιμπράναι.)

D109.2–4 [*104.37–39*] **τὰ πηδάλια συντρίβων καὶ τὸν ταρσὸν παρασύρων εἰς τὴν γῆν κάταγε** ('crush (in each case) the rudders and snap off the oarage and bring (the vessel) into land'). On a ship's pairs of rudders (or steering-oars) see generally Casson, *Ships* 46 and esp. 224–228. The verb Ph. uses in connection with them here, συντρίβειν, is one of his favourites to describe military damage, and copiously attested in that context elsewhere (if not specifically for snapping *pêdalia*, which is described elsewhere by such vocabulary as ἀνακλᾶν and ἐκκόπτειν; for συντρίβειν cf. πηδάλια συντρίψας νεώς in Diphilus fr.42.11 K.-A., though there a merchant ship-owner has damaged his own vessel). By contrast Ph.'s παρασυρειν is rather more of a rarity, but it is paralleled in precisely this sense in historical narratives: Diod.Sic. 11.18.6 (ὧν δὲ τοὺς ταρσοὺς παρέσυρον), 13.16.5 (παρασυρομένων τῶν ταρσῶν), 13.78.1 (ὧν δὲ τοὺς ταρσοὺς παρασύρων), (?)13.99.3 (τῶν δὲ τοὺς ταρσοὺς <παρασύρων> ἀχρήστους ἀπετέλει πρὸς τὴν μάχην: standard supplement by Wurm and Cobet), 18.72.8 (ὧν δὲ τοὺς ταρσοὺς παρέσυρον), 20.51.3 (αἱ μὲν παρέσυρον ἀλλήλων τοὺς ταρσούς), and Plb. 16.4.14 (παρασύροντες τῶν πολεμίων νεῶν τοὺς ταρσοὺς ἠχρείουν). For a ship's *tarsoi* (Attic *tarroi*) of oars see generally LSJ s. v. ταρσός, II.2, and Casson, *Ships* 84 n.37, 265 n.3. (There was one *tarsos* on each side, so Ph. should properly have used the plural. Compare Plb. 16. 3–4 on the battle of Chios, 201: in 16.3.12 a charging vessel loses its *dexios tarsos*; in 16.4.5 & 14 others sustain damage to (*sc.* both of) their *tarsoi*. For singular ταρσός cf. nevertheless App. *BC* 5.82.)



The scenario that Ph. describes here is speculatively expanded by W. M. Murray, *Age of Titans* 301 n.55; he lays especial emphasis on Ph.'s stipulation that these tactics be implemented ἐν τάξει παντὶ τῷ στόλῳ (D108.3 [*104.35*]), this so as to minimize the risk to one's own vessels.

D110.1–2 [*104.39–40*] **Ἐὰν δὲ μὴ ἔχῃς ναῦς, τῷ πυρὶ καὶ τοῖς βέλεσι χρώμενος κώλυε αὐτοὺς <ἀπάλλαξιν> ποιήσασθαι** ('Should you not have warships, prevent them by the use of fire and projectiles from making <an escape>.'). Schoene marked a lacuna (as is clearly needed), tentatively suggesting <ἀπόβασιν>, 'landing', to fill it. Diels-Schramm 84 and Garlan 327 both print Diels's <ἀπάλλαξιν> (for which cf. Hdt. 9.13.3). 'Landing' has the advantage of being an attested part of Ph.'s vocabulary (at C51.2 [*94.37*]) but might not be what Ph. was talking about here.

D111 [104.40–42]: conclusion

D111.1–3 [*104.40–42*] **Τοῦτον ἄν τις τὸν τρόπον πολιορκῶν τὰς πόλεις ἂν λαμβάνοι μάλιστα μηθὲν αὐτὸς ἀνήκεστον παθών** ('Anyone besieging cities in this way is especially likely to capture them while suffering nothing ruinous himself'). As Lawrence 106 comments, 'in this way' encompasses everything that has been recommended in part D.

With μηθὲν αὐτὸς ἀνήκεστον παθών cf. e. g. Cleon in Thuc. 3.39.7 (σφαλέντι μηδὲν παθεῖν ἀνήκεστον); Demosth. 54.5; Diod.Sic. 13.26.2, 17.15.2; Plb. 4.18.11, 15.1.8; Joseph. *AJ* 15.131, 146 & 197, *BJ* 3.481.

This ending is echoed at the end of the *Par.Pol.*, 276.15–17 (58.8–10), but sharpened there by the specification of *Arab* cities (Sullivan, *Siegecraft* 247–248); see **Appendix 3** passage no.9.

APPENDIX 1

VITRUVIUS, *DE ARCHITECTURA* 1.5.1–8

In section 4 of the preface to his Book 3, Vitruvius summarizes under four heads what he had aimed to cover in Book 1: *Itaque, imperator, in primo volumine tibi* (i) *de arte et quas habeat ea virtutes quibusque disciplinis oporteat esse auctum architectum exposui, et subieci causas quid ita earum oporteat eum esse peritum* (ii) *rationesque summae architecturae partitione distribui finitionibusque terminavi.* (iii) *Deinde, quod erat primum et necessarium, de moenibus, quemadmodum eligantur loci salubres, ratiocinationibus explicui,* (iv) *venti qui sint et e quibus regionibus singuli spirant, deformationibus grammicis ostendi platearumque et vicorum uti emendate fiant distributiones in moenibus docui et ita finitionem primo volumine constitui.* However, as is well recognized, this resumé makes a rather poor match with the actual contents of Book 1. While harking back recognizably enough to most of the subjects covered there, some it omits. What I have here designated i [the architect's qualities and areas of expertise] does correspond to 1.1; ii [architectural divisions and definitions] to 1.2–3; iii [choosing a healthy site for locating towns] to 1.4; and iv [winds] to 1.6. However, there is no allusion either to the short 1.7 [allocation of public spaces, particularly for temples, a topic pursued in full in Books 3–4) or – and crucially for present purposes – to 1.5, on the construction of walls.

That this retrospective summary was concerned to mention only the most important topics covered is a possibility that cannot be ruled out, but a more plausible hypothesis must be that more material had been added, in a sort of "second edition", after the summary was drafted; so P. Fleury, *Vitruve. De l'Architecture. Livre I* (Paris 1990) lxxx.

Readers of Vitruvius 1.5 cannot fail to pick up echoes of Ph. – especially (though not only) his part A – from that part of it which begins at *turrium murorumque fundamenta sic sunt facienda* in 1.5.1. In I.D. Rowland and T.N. Howe (eds.), *Vitruvius: ten books on architecture* (Cambridge 1999) 156, this fact is expressed as follows: '[t]he first section of Chapter 5 amounts to a condensed version of book 5 of the *Mechanical Syntaxis* of the engineer Philo of Byzantium (second century BC), which has often been thought of as a virtually independent treatise on fortification'. This restriction to 'the first section' of Vitruvius 1.5 need not be challenged if we define 'first' as embracing 1.5.1–6 (see below under 1.5.7 and 1.5.8); also, Howe does go on to allow for expansion as well as condensation (see below under 1.5.3). But a central issue evaded is whether Vitruvius had read Ph. direct or through an intermediary. The question must at least be posed, even if it cannot be answered with any hope of certitude. Fleury (above) xcv–xcvi tentatively postulates 'un traité de fortification hellénistique (auquel Vitruve a probablement mêlé des éléments personnels)', a formulation which later (xcix) becomes a scenario in which 'Vitruve a utilisé sinon le traité de Philon lui-même tout au moins des textes hellénistiques de la même veine'.

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(1.5.1) *Cum ergo his rationibus erit salubritatis moenium conlocandorum explicatio regionesque electae fuerint fructibus ad alendam civitatem copiosae et viarum munitiones aut opportunitates fluminum seu per portus marinae subvectiones habuerint ad moenia comportationes expeditas, tunc turrium murorumque fundamenta sic sunt facienda uti fodiantur, si queat inveniri, ad solidum et in solido quantum ex amplitudine operis pro ratione videatur, crassitudine ampliore quam parietum qui supra terram sunt futuri et ea impleantur quam solidissima structura.* ('When, therefore, a policy for establishing walled towns has been drawn up in accordance with these criteria of good health [1.4] and territories chosen that are fertile in produce to nourish the citizenry, and the building of roads or access to rivers or seaports will ensure easy transport to the town, then is the time to construct the foundations of the towers and walls – on these principles: dig down to what is firm, if it can be found, and build on what is firm, to a scale that seems required by the dimensions of the project, and with a breadth greater than that of the walls which will be above ground; thus their construction should rest on a base as solid as possible'.)

See the Comm. to A1 **τοὺς οἰκοδομοῦντας**, **ὀρύξαντας**, and **τιθέναι**.

(1.5.2) *Item turres sunt proiciendae in exteriorem partem uti, cum ad murum hostis impetu velit adpropinquare, a turribus dextra ac sinistra lateribus apertis telis vulnerentur. Curandumque maxime videtur ut non facilis aditus sit ad oppugnandum murum, sed ita circumdandum ad loca praecipitia et excogitandum uti portarum itinera non sint directa sed scaeva. Namque cum ita factum fuerit, tum dextrum latus accedentibus, quo scuto non erit tectum, proximum erit muro. Conlocanda autem oppida sunt non quadrata nec procurrentibus angulis, sed circumitionibus uti hostis ex pluribus locis conspiciatur. In quibus enim anguli procurrunt, difficiliter defenditur quod angulus magis hostem tuetur quam civem.* ('Also, towers should project toward the outside, so that when the enemy want to rush to the wall in attack they would be wounded, with their flanks exposed, by projectiles from the towers on right and left. And particular care is needed to ensure that there would be no easy approach for attacking the wall; instead, locations leading steeply downhill should be encircled, and thought be given to having the ways to the gates not direct but left-turning. For when they are made in that way, the right flank of those approaching – the one not covered by the shield – will be next to the wall. Moreover, fortified towns should not be planned as squares or with protruding corners but as circuits, so that the enemy can be seen from many places; the reason is that, in ones where the corners do protrude, defence is difficult because the corner protects the enemy more than the citizen'.)

See the Comm. to A6 **τοὺς δὲ κατὰ τοὺς πυλεῶνας**, to A21 **συνεργοῦντες** and to A52 **τούς τε προσερχομένους**.

(1.5.3) *Crassitudinem autem muri ita faciendam censeo uti armati homines supra obviam venientes alius alium sine inpeditione praeterire possint, dum in crassitudine perpetuae taleae oleagineae ustilatae quam creberrime instruantur uti utraeque muri frontes inter se, quemadmodum fibulis, his taleis conligatae aeternam habeant firmitatem; namque ei materiae nec caries nec tempestates nec vetus-*

tas potest nocere, sed ea et in terra obruta et in aqua conlocata permanet sine vitiis utilis sempiterno. Itaque non solum in muro sed etiam in substructionibus quique parietes murali crassitudine erunt faciundi hac ratione religati non cito vitiabuntur. ('Furthermore, I consider that the breadth of the wall should be made such that armed men coming along the top may be able to pass one another without obstruction, while within its breadth a continuous sequence of charred olive-wood rods should be inserted as frequently as possible, so that each of the faces of the wall are joined together by these rods, as if by pins, and have everlasting solidity: neither decay nor storms nor time can harm this material, which, whether buried in earth or sunk in water, remains unimpaired and functional for ever. So this is the procedure to be followed in the breadth not only of the wall itself but also its substructures and and any wall-faces, and when tied by this method they will be slow to become faulty'.)

Introduced as Vitruvius' personal opinion (*censeo*), 1.5.3 does not correspond precisely to anything in Ph., and it has been described as 'a rather strange, or innovative, combination of a Hellenistic curtain and the *murus gallicus* described by Caesar [*BG* 7.23]' (Rowland and Howe, *Vitruvius* 156 and fig.18); see further in the Comm. to A13 **ξυλὰ δρύινα** and to A17 **πλάτη**.

(1.5.4) *Intervalla autem turrium ita sunt facienda ut ne longius sit alia ab alia sagittae missionis, uti, si qua oppugnetur, tum a turribus quae erunt dextra ac sinistra scorpionibus reliquisque telorum missionibus hostes reiciantur. Etiamque contra inferiores <partes> turrium dividendus est murus intervallis tam magnis quam erunt turres, ut itinera sint interioribus partibus turrium contignata neque ea ferro fixa; hostis enim si quam partem muri occupaverit, qui repugnabunt rescindent et, si celeriter administraverint, non patientur reliquas partes turrium murique hostem penetrare nisi se voluerit praecipitare.* ('The intervals between the towers, moreover, should be made such that the distance between one and another is no longer than a *sagitta*-shot; this is so that, if an attack occurs anywhere, the enemy are repulsed by the catapults and other projectiles launched from the towers which will be on their right and left. In addition, the wall must be separated out on the lower <parts> of the towers, at intervals as large as the towers will be, for the creation of wooden pathways in the inner parts of the towers. These should not be fastened with iron, because if the enemy gains possession of any part of the wall, the defenders can cut it away; and if they have managed this quickly they will not allow the enemy to reach the other parts of the towers and the wall without being willing to fall off'.)

See the Comm. to A15 **ἀπὸ τῶν**, A16 **κυριεύσαντες**, A21 **συνεργοῦντες** and A62 **Τοῖς δὲ πύργοις**.

(1.5.5) *Turres itaque rotundae aut polygoneae sunt faciendae: quadratas enim machinae celerius dissipant quod angulos arietes tundendo frangunt, in rotundationibus autem uti cuneos ad centrum adigendo laedere non possunt. Item munitiones muri turriumque aggeribus coniunctae maxime sunt tutiores quod neque arietes neque suffossiones neque machinae ceterae eis valent nocere.* ('Towers themselves should be built round or polygonal; for machines ruin square ones more quickly – because rams break their corners by pounding – whereas on curvatures they press into the centre, like wedges, and are unable to inflict damage. Likewise, building a wall and towers is made most secure when they linked with (*sc.* earthen) ramparts, because neither rams nor undermining nor other devices are strong enough to harm ramparts'.)

See the Comm. to A3 **τοὺς δὲ ἐξαγώνους** and to A65 **διὰ <τὸ> τῶν πετροβόλων**.

(1.5.6) *Sed non in omnibus locis est aggeris ratio facienda, nisi quibus extra murum ex alto loco plano pede accessus fuerit ad moenia oppugnanda. Itaque in eiusmodi locis primum fossae sunt faciendae latitudinibus et altitudinibus quam amplissimis, deinde fundamentum muri deprimendum est intra alveum fossae et id extruendum est ea crassitudine ut opus terrenum facile sustineatur.* ('Building a rampart is not justified everywhere, however, but only in places where outside the wall there is level access from high ground to the walls that will come under attack. In places of this kind the first task is to create trenches, as wide and as deep as possible; then the foundation of a wall must be dug inside the bed of the trench and extended to such a breadth that the earthwork can easily be supported'.)

See the Comm. to A83 **καὶ αἱ τάφροι**.

(1.5.7) *Item interiore parte substructionis fundamentum distans ab exteriore introrsus amplo spatio ita uti cohortes possint, quemadmodum in acie instructae, ad defendendum supra latitudinem aggeris consistere. Cum autem fundamenta ita distantia inter se fuerint constituta, tunc inter ea alia transversa, coniuncta exteriori et interiori fundamento, pectinatim disposita, quemadmodum serrae dentes solent esse, conlocentur; cum enim sic erit factum, tunc ita oneris terreni magnitudo distributa in parvas partes neque universa pondere premens poterit ulla ratione extrudere muri substructiones.* ('Also, in the inner part of the substructure there should be a(nother) foundation, at a distance far enough inside the outer one to leave enough room for cohorts to be able to be stationed, drawn up as if in battle order, along the broad top of the rampart for its defence. When foundations have been laid at this distance from one another, position cross-walls between them – joined to the outer and inner foundation – laid out comb-fashion, just like the teeth of a saw usually are; for when made so, the enormous mass of earth will be divided into small parts; it will not, by pressing with its entire weight, be for any reason capable of pushing the substructures of the wall outwards'.)

(No surviving equivalent in Ph., though one cannot help wondering whether *quemadmodum serrae dentes solent esse* owes anything to Ph.'s πριονωτή, used in a quite different context: A44.2 [*83.8*] and A84.4 [*86.6*]).

(1.5.8) *De ipso autem muro, e qua materia struatur aut perficiatur, ideo non est praefiniendum quod in omnibus locis, quas optamus copias, eas non possumus habere. Sed ubi sunt saxa quadrata sive silex seu caementum aut coctus later sive crudus, his erit utendum. Non enim uti Babylone abundantes liquido bitumine, pro calce et harena, ex cocto latere factum habent murum, sic item possunt omnes regiones seu locorum proprietates habere tantas eiusdem generis utilitates, uti ex his comparationibus ad aeternitatem perfectus habeatur sine vitio murus.* ('Concerning

the wall itself, though, and the material from which it should be constructed and finished, there is a reason why no prescription can be given: it is because we cannot have, everywhere, the resources we hope for. Instead, where there is stone in blocks or flint-stone or rubble or brick, burnt or unburnt, these will be the things to use. For not everywhere is like Babylon, with plenty of liquid bitumen to use in place of lime and sand: they have a wall made of burnt brick. Every territory can have local characteristics or comparable advantages of the same kind, such that from these materials it may have a wall faultless and perfect for ever'.)

No surviving equivalent in Ph. for most of this, but for Babylon and 'bitumen' see the Comm. to B53 **ναπτάλιον**.

APPENDIX 2

ATHENAEUS MECHANICUS 15.13–18.7 (AND VITRUVIUS 10.14.1–3)

Τοῦτο τὸ κατασκεύασμά φης Φίλων ὁ Ἀθηναῖος χρήσιμον (16) εἶναι πρός τε [τὰς γινομένας εἰς] τὴν προσαγωγὴν τῶν μηχανημά|των καὶ τὰς παρεκτάσεις τῶν στωιδίων καὶ τὰς συγχώσεις τῶν | τάφρων καὶ ἐάν τινα ἄλλον τόπον δέῃ χῶσαι· χρήσιμον δὲ καὶ | πρὸς τὰς ἐφεδρείας τοῦτο γίνεται. Πήγνυται δὲ αὐτὴ εἰς ἐσχάριον | τετράγωνον, ἔχον τὴν πλευρὰν ἑκάστην πηχῶν ΙΔ· ἔχει δὲ καὶ δια|πήγματα τέσσαρα καὶ περιπήγματα δύο ἕκαστα πάχη ἔχοντα δεκα|δάκτυλα, τὰ δὲ πλάτη τριπάλαιστα. | Διάπηγμα ἕκαστον ἀπεχέτω δύο πήχεις καὶ παλαιστὴν ἕνα. | Λαμβάνει δὲ ἁμαξίποδας ἑκάστη χώρα τέσσαρας τῶν ἐν ταῖς | γωνίαις, ἐν οἷς στρέφονται οἱ τῶν τροχῶν ἄξονες ἀποκλειόμενοι | σπάθαις σιδηραῖς· ἵνα, ὅταν δέῃ παροδοποιεῖν προάγοντας (τουτ|έστιν εἰς τοὔμπροσθεν πλατὺν τόπον ποιεῖν ἢ καὶ ὅμαλον πρὸς τὸ πο|λεμῆσαι ἢ καὶ παρατιθέναι τινὰ μηχανήματα), ἐξῇ ἐκσπάσαντα | τοὺς τροχοὺς μεταθεῖναι καὶ ἀποκλεῖσαι τοὺς ἄξονας. Οἱ δὲ τροχοὶ γίνον(17)ται τέσσαρες, τὴν μὲν διάμετρον τριπήχεις, τὸ δὲ πάχος ποδιαῖοι, | δεδεμένοι σιδηραῖς λεπίσι ψυχρηλάτοις. Ἐπιζεύγνυται δὲ ἐπὶ τοῦ | ἐσχαρίου ξύλα δύο ἑκατέρας πλευρᾶς ὑπερέχοντα καθ' ἑκάτε|ρον μέρος τοῦ μήκους πήχεις Δ· περὶ δὲ τὰς ὑπεροχὰς αὐτῶν | περιπήγνυται ἄλλα δύο ξύλα ὑπερέχοντα ἐκ μὲν τοῦ πρόσθεν | μέρους πήχεις Η, ἐκ δὲ τοῦ ὀπίσω πήχεις Δ· πάχη δὲ ἕκαστα | λαμβάνει αὐτῶν καὶ πλάτη τὰ αὐτὰ τῷ ἐσχαρίῳ. Αὐτῷ τ' ἐσπή|γνυται τῷ ἐσχαρίῳ ἐπὶ τὸ πλινθίον αὐτοῦ κίονες ἑπταπήχεις διαλείποντες ἀπ' ἀλλήλων ἕκαστος πῆχυν ἕνα. Κατακλείει δὲ αὐτοὺς | ἐπάνω κύκλῳ πάντας ἐπιστύλιον· καὶ ἀπ' αὐτοῦ συστάται ἵστανται εἰς | ἀλλήλους ἐξερείδοντες, τὴν ἀνάστασιν τοῦ ὕψους ποιοῦντες πήχεις Η· | ἐπὶ δὲ τῶν συστατῶν ἐπιζεύγνυται δοκός. Οἱ δὲ συστάται ἀντηρίσι | καὶ πλευρώμασι διαλαμβάνονται· καὶ φράττονται αἱ στέγαι πᾶσαι | σανιδώμασι, μάλιστα μὲν φοινικίνοις, εἰ δὲ μή, τῶν ἄλλων ὅσα | εὔτονά ἐστι ξύλα πλὴν κεδρίνων, πευκίνων καὶ κληθρίνων· ταῦτα (18) γὰρ ἔκπυρά ἐστι καὶ εὔκλαστα. Καταλαμβάνεται δὲ ἄνωθεν τὸ | σανίδωμα γέρροις πεπλεγμένοις λεπτοῖς καὶ πυκνοῖς ὡς ἔνι προσ|φάτοις· ἐπὶ δὲ τούτοις καταλαμβάνονται βύρσαις ῥεραμέναις | ὁμοίως ταῖς τύλαις, καὶ σάττεται εἰς αὐτὰς μάλιστα μὲν ἔλεια ἢ τὸ | καλούμενον θαλασσόπρασον ἢ ἄχυρα ὄξει βεβρεγμένα· ταῦτα | δέ εἰσι χρήσιμα πρός τε τὰς τῶν λιθοβόλων πληγὰς καὶ πρὸς | τοὺς ἐμπυρισμούς ('This construct Philo of Athens [*sic*] declares to be useful for [the events leading to] the deployment of machines and the extension of small stoas and the filling-in of trenches and any other place which needs filling; this is also useful for the troops-in-waiting. It is fixed into a square base, having 14 cubits (6.47 m.) on each side; it also has four bars across and two around, each ten dactyls (19.3 cm.) in thickness and three palms (23.13 cm.) in breadth. Let each crossbar be two cubits and one palm (1.00 m.) apart. Each place of those in the corners takes (*sc.* one of) four wagonfeet, in which the axles of the wheels rotate, closed off with iron plates; this is so that whenever it is necessary to those advancing them to make a detour – that is, to make the place in front broad or uniform for battle, or to put certain (other) machines in place – it may be possible to pull out the wheels, change their position, and close off the axles (again). The wheels are four, in diameter three cu-

bits (1.39 m.) but in thickness a foot (30.83 cm.), bound with iron strips cold-hammered. Yoked onto the base are two timbers projecting over either side in either part by a length of 4 cubits (1.85 m.); around their projections are fixed another two timbers projecting from the forward part (of the tortoise) by 8 cubits (3.70 m.) but from the rear by four cubits (1.85 m.); the thickness and breadth of each of these is the same as those on the base. Onto the base itself, on its platform, are pegged seven-cubit (3.24 m.) posts, one cubit (46.24 cm.) apart from each other. Holding them in at the top all round is an architrave; and from it rafters are set up leaning in support towards each other, making the rise in height 8 cubits (3.70 m.); onto the top of the rafters is yoked a beam. The rafters are secured with stays and transoms; and all the roofs are protected with planking, ideally in palm-wood, but failing that, (one) of the other springy woods except cedar, pine and alder; for these are flammable and easily broken. The planking is covered at the top with fine and close-packed wicker, as fresh as possible; on these (the roofs) are covered with stitched hides like mattresses, and stuffed into them are, ideally, marsh-plants or the so-called sea-leek or chaff soaked in vinegar; these are useful against the blows of stone-projectors and against incendiary attacks').

The parallel passage of Vitruvius, 10.14.1–3, runs as follows: (*Testudo quae ad congestionem fossarum paratur – eaque etiam accessus ad murum potest habere – sic erit facienda. Basis compingatur, quae graece ἐσχάρα dicitur, quadrata habens quoqueversus latera singula pedum xxi and transversaria iiii. Haec autem contineantur ab alteris duobus crassis i s, latis s; distent autem transversaria inter se circiter pedes iii s. Supponanturque in singulis intervallis eorum arbusculae, quae graece* ἀμαξόποδες (sic) *dicuntur, in quibus versantur rotarum axes conclusi lamnis ferreis. Eaeque arbusculae ita sint temperatae ut habeant cardines et foramina, quo vectes traiecti versationes earum expediant, uti ante et post et ad dextrum seu sinistrum latus, sive oblique ad angulos opus fuerit, ad id per arbusculas versatas progredi possint.* (2) *Conlocentur autem insuper basim tigna duo, in utramque partem proiecta pedes senos, quorum circa proiecturas figantur altera proiecta duo tigna ante frontes pedes vii crassa et lata uti in basi sunt scripta. Insuper hanc compactionem exigantur postes compactiles, praeter cardines pedum viiii, crassitudine quoquoversus palmopedales, intervalla habentes inter se sesquipedes. Ea concludantur superne intercardinatis trabibus. Supra trabes conlocentur capreoli cardinibus alius in alium conclusi, in altitudine excitati pedes viiii. Supra capreolos conlocetur quadratum tignum quo capreoli coniungantur.* (3) *Ipsi autem laterariis circa fixis contineantur, teganturque tabulis maxime palmeis, si non, ex cetera materia, quae maxime habere potest virtutem, praeter pinum aut alnum; haec enim sunt fragilia et faciliter recipiunt ignem. Circum tabulata conlocentur crates ex tenuibus virgis creberrime textae maximeque recentibus. Percrudis coriis duplicibus consutis, fartis alga aut paleis in aceto maceratis, circa tegatur machina tota. Ita ab his reicientur plagae ballistarum et impetus incendiorum.* ('The tortoise that is prepared for filling trenches – and which can also provide access to the wall – will be made as follows. A base is assembled, called in Greek an ἐσχάρα: square, 21 feet long on each side, and with 4 crossbars; these are held in place by two others, 1½ feet thick and ½ wide; the crossbars should have about 3½ feet of space between

them. In each of their internals, underneath, *arbusculae* – called in Greek wagon-feet – are inserted, within which the axles of the wheels rotate, enclosed in iron plates. These *arbusculae* should be arranged in such a way as to have pivots and holes, in which inserted levers can make them turn; thus whether there is a need to move in front and behind and to the right or left side, or obliquely at angles, they can proceed there by having the *arbusculae* turned. (2) Above the base should be placed two timbers, projecting six feet beyond each end; around these projections two other timbers should be fixed in place, projecting 7 feet in front of the faces, and as thick and wide as has been given for the base. Above this framework should be raised fitted posts, 9 feet (in length) excluding the tenons, foot-and-a-palm in thickness on every side, and having foot-and-a-half spaces between them. These should be held in place at the top by beams tenoned-together. Above the beams, cross-braces should be placed, enclosed one to another by junctions, raised up to a height of 9 feet. Above the cross-braces should be placed a squared timber, by which the cross-braces are connected. (3) These (components) should be held in place all around by fixed side-beams, and they should be covered with planks, ideally in palm-wood, but failing that, made out of another wood which can ideally have (palm's) excellence – except pine or alder, because they are fragile and easily catch fire. Around the planking should be placed lattices made out of thin wicker, tightly woven and as freshly-cut as possible. The entire machine is covered all over with raw hides, sewn double, and stuffed with seaweed or with chaff soaked in vinegar; these will repel the blows of catapults and the impact of incendiaries'.)

As is plain to see, these two passages are very similar from start to finish, a fact reflecting their common (Greek) source Agesistratus. Vitruvius – who chooses not to name Ph. at the start of the material – converts the various Greek dimensions into Roman feet and glosses two items of Greek vocabulary. Beyond that, he omits some substantive detail which Athenaeus gives, while proffering some which Athenaeus does not have; and some elements of construction differ between the two versions. (Bibliography and discussion in Whitehead and Blyth, *Athenaeus* 108–118, with the review by D. B. Campbell, *BMCR* 2005.07.63.) For my purposes here, the short passage of Vitruvius underlined above is of particular note; it is probably to be regarded as a refinement of his own.

See further in the Comm. to D10 **τά τε μηχανήματα**.

APPENDIX 3

PHILO-DERIVED PASSAGES IN THE *PARANGELMATA POLIORKETIKA*

Small echoes of phraseology and vocabulary are noted in the Comm. to the passage(s) where they occur; quoted here are nine instances where the Byzantine writer's debt to Ph. is more extensive.

1. 203.2–4 Wescher (3.43–46 Sullivan): σὺν τοῖς σκευαζομένοις τροφίμοις ἔν τε πολιορκίαις καὶ στρατεύμασιν ὀλιγαρκέσιν ἐπιμονιδίοις [or: Ἐπιμενιδείοις] λεγομένοις φαρμάκοις καί τισι σμικροτάτοις βρώμασιν πλησμίοις ἀδιψίαν ἐμποιοῦσιν.

'…with the nourishments being prepared in both sieges and expeditions: minimum requirements called long-lasting [or: Epimenideian] potions, and certain very small food-items that are filling and produce no thirst'.

See Ph.'s B31 [*88.25–31*] and B40 [*89.8–10*].

2. 204.8–18 (4.4–15): τὰς τῶν πόλεων θέσεις ἀκριβῶς διερχόμενον ἐπισκέπτεσθαι χρὴ πρότερον, καὶ τὴν τοῦ ἰδίου λαοῦ πρὸ πάντων ἀβλαβῆ ποιούμενον φύλαξιν τῆς πολιορκίας ἀπάρχεσθαι, πρὸς ἄλλους μὲν τόπους καστρομαχεῖν ἐνδεικνύμενον, εἰς τὸ ἐκεῖσε τοὺς ἐχθροὺς ἀπατωμένους παρασκευάζεσθαι, καὶ πρὸς ἄλλους εἰσφέρειν τὰ μηχανήματα, τὴν δὲ προσβολὴν πρὸς τὰ σαθρότερα τῶν τειχῶν ἐκ διαδοχῆς στρατιωτικῶν ταγμάτων κατὰ συνέχειαν ποιεῖσθαι, σὺν πολλῷ θορύβῳ τοὺς ἔνδον περισπῶντα καὶ σάλπιγγας νύκτωρ ἐπὶ τὰ ὀχυρώτερα μέρη ἀνίεσθαι, ἵνα ὑπολαμβάνοντες οἱ πλεῖστοι ταῦτα ἁλίσκεσθαι, ἀπὸ τῶν μεταπυργίων μετὰ τῶν ἄλλων ἐκφύγωσι.

'(The commander of a besieging force) must first go about and inspect precisely the positions of the cities; and making safe the protection of his own host above all, begin the siege: appearing to attack the fortification in some places, with a view to deceiving the enemy into making preparations there, and sending in the machines to others. (He must) make the attack against the more feeble (sections) of the walls with continuous relays of units of soldiers, distract with a great hubbub those inside and sound trumpets by night at the stouter parts, in order that the majority, supposing that these (parts) are being captured, would flee from the curtains with the others'.

See Ph.'s (D6) [*96.42–49*], D9 [*97.9–19*], D18 [*98.13–17*] and D26–27 [*98.45–99.3*].

3. 207.12–16 (8.1–5): Βέλτιον δὲ προσάγειν καὶ τὰς λεγομένας γερροχελώνας, ἐλαφροτέρας τῶν ῥηθέντων ἐμβόλων καὶ ὁμοιοσχήμους οὔσας, κατασκευαζομένας ἐκ πλοκῆς ἰτεΐνων βεργῶν νεοτμήτων ἢ ἐκ μυρίκης ἢ φιλύρας, ὀξείας καὶ αὐτὰς κατὰ πρόσωπον οὔσας ἄχρι τῆς κατὰ κορυφὴν ῥάχεως.

'(It is) better to deploy the so-called wicker-tortoises, as being lighter than the aforementioned beaks and similar in form, constructed out of plaiting of freshly-cut branches of willow or out of tamarisk or lime; these too are sharp in front as far as the ridge on the crest'.

See Ph.'s D36–37 [*99.29–37*].

4. 209.3–212.10 (11.1–29): Εἰ δὲ ἐν ἐπιπέδοις καὶ ὁμαλοῖς τόποις ὦσιν αἱ πόλεις κείμεναι, τὰς χωστρίδας δεῖ προσάγεσθαι χελώνας, ὑποτρόχους αὐτὰς οὔσας καὶ ἔμπροσθεν καταστεγεῖς, ἵνα οἱ τὰς τάφρους χωννύοντες ἀπὸ τῶν ἐναντίων μὴ πλήττωνται· ἢ τὰς προειρημένας λαίσας, ὡς ἐλαφροτάτας καὶ χρησίμους πρὸς τὸ χωννύειν τάφρους, τόπους τε ἐνύδρους καὶ ὑπόμβρους ἀναγεμίζειν καὶ παντοῖα λακκίσματα ἐξομαλίζειν τοῖς τείχεσι πλησιάζοντα, ὅπως εὐδιάβατον καὶ ἀκίνδυνον τὴν τῶν μηχανημάτων ἀγωγὴν ποιησώμεθα. Δεῖ δὲ ἀκριβῶς σκοποῦντας ἀνερευνᾶν τὰς ἐπὶ τὰς τάφρους φαινομένας ἰσοπέδους διαβάσεις διὰ τὰ κάτωθεν πολλάκις κρυπτόμενα ὑπὸ τῶν ἐναντίων κεράμια, καὶ τοῖς μὲν ἀνθρώποις εὐδιάβατον καὶ ἀκίνδυνον τὴν ὁδὸν ἀποφαίνεσθαι, τοῖς δὲ προσφερομένοις ὀργάνοις λίαν βαρυτάτοις οὖσι καταδύνειν καὶ διασπᾶσθαι ἐπὶ τῇ θραύσει καὶ ἐπιδόσει τῶν ὑποκειμένων κεραμίων. Ὅθεν χρὴ μετὰ ἀκοντίων εὐτόνων λόγχας ἀσφαλεῖς ἐχόντων ἢ ὁλοσιδήρων ἢ τρυπάνων τινῶν ἐπιτηδείων τὴν ἀπόπειραν ποιεῖσθαι· πρὸς δὲ τοὺς κατεσπαρμένους ὑπὸ τῶν ἐχθρῶν σιδηροῦς τριβόλους τῇ γῇ ἀναμιγνυμένους καὶ ἀφανεῖς ὄντας ξύλινα ὑποθέματα πρὸς τοὺς πόδας τοῖς ὑποδήμασι κάτωθεν ὑποθέντας ἀβλαβῶς διαβαίνειν ἢ τοῖς γεωργικοῖς κτεσὶν οὓς καὶ γριφάνας τινὲς καλοῦσιν, ὀδοντωτοῖς οὖσιν, τούτους ἀνακαθαίρειν· καὶ πρὸς τὰς ἐπὶ βοθρεύμασι τιθεμένας θύρας πρόπειραν ποιουμένους ταῖς δικέλλαις ἀνασκάπτειν. Χρὴ δὲ καὶ τὰς ὑπὸ γῆν πρὸς τῷ τείχει γινομένας ὑπορύξεις κρυφίας βαθείας πρὸς τοῖς θεμελίοις ποιεῖσθαι, καὶ μὴ εἰς ὄψιν τῆς γῆς, ἵνα μὴ διαγνόντες οἱ πολέμιοι ἔνδον ἀντορύξωσι καὶ τῷ τείχει ἀντιτρυπήσαντες καπνῷ ἢ ὕδατι τοὺς τὴν ὀρυγὴν κατεργαζομένους ἀπολέσωσι.

'If the cities are situated in level and even places, it is necessary (for those attacking them) to deploy filler tortoises, which have wheels and are covered in front, in order that those filling the trenches be not hit by the opponents; or the aforementioned laisai, as they are very light and are useful for filling trenches, for loading up places that are swampy and rain-soaked and for levelling out all kinds of potholes near the walls, so that we may make the deployment of the machines passable and risk-free. It is necessary to examine, by precisely inspecting, those passages over trenches that appear level, because pots are often hidden underneath by the opponents; and whereas for humans the way does appear passable and risk-free, for the excessively heavy engines being deployed it sinks down and is broken apart with the destruction and collapse of the pots beneath the surface. Hence one should conduct a test with sturdy javelins which have secure (iron) heads, or all-iron ones, or with some appropriate drills; and against the iron triboloi sown by the enemy, which are mixed in the earth and invisible, (one should) place wooden supports under the shoes on one's feet to cross unharmed, or clear these away with the agricultural rakes, large-toothed, that some also call griphanai; and when making a test for doors placed over holes (one should) dig them up with mattocks. One should also make underground tunnels to the walls, secret (and) as deep as the foundations and not visible above ground, in order that the enemy inside does not identify them and dig a counter-tunnel and, after counter-boring through the wall, kill by smoke or water those working on the excavation'.

See Ph.'s A76 [*85.22–29*], D10 [*97.19–30*], D30 [*99.11–13*], D32 [*99.18–19*], D39 [*99.41–44*] and D43–44 [*100.2–11*].

5. 212.11–214.3 (12.1–25): Τὸν δὲ βουλόμενον εὐκόπως πορθεῖν τὰς πόλεις, κατὰ Φίλωνα τὸν Ἀθηναῖον, δεῖ μάλιστα τρυγητοῦ ὄντος ἢ ἑορτῆς ἔξω τῆς πόλεως ἀγομένης ἀθρόαν τὴν ἐπίθεσιν ποιεῖσθαι· πλείστους γὰρ ἔξω τότε χειρούμενον εὐάλωτον ἢ ὑπόφορον καὶ τὴν πόλιν ἐκ τῶν λοιπῶν οἰκητόρων διὰ τὴν πρὸς αὐτοὺς στοργὴν ἢ συγγένειαν ἀνταλλαττόμενον ἕξειν. Εἰ δὲ κατὰ κλοπὴν νυκτὸς τὴν πόλιν βουλόμεθα λαβεῖν τῶν πολιτῶν τὴν ἔλευσιν ἡμῶν ἀγνοούντων καὶ ἀνελπίστων ὄντων, χειμῶνος καταλαβόντος ὅτε τῷ κρύει τούτων οἱ πλείους ἐν ταῖς οἰκίαις συστέλλονται καὶ ἀπαράσκευοι πρὸς μάχην τυγχάνουσιν, ἢ πανδήμου ἑορτῆς ἐν τῇ πόλει τελουμένης καὶ τοῦ πλήθους ἐπὶ τῇ τελετῇ παιγνίοις σχολάζοντος ἢ καταφόρου ὑπὸ τῆς μέθης ὄντος, κλίμακας ποιήσαντες δερματίνας τῷ τείχει προσάξομεν, αἵτινες ῥάπτονται καθάπερ οἱ ἀσκοὶ καὶ τῇ ἀλοιφῇ ἐμφραττόμεναι περὶ τὰς ῥαφὰς ἀναγεμίζονται ὥστε μὴ διαπνεῖν· ἐμφυσωμένων γὰρ καὶ πνεύματος πληρουμένων τοῦ διαπνεῖν κωλυομένων, ἐξορθοῦσθαι αὐτὰς ἀνάγκη, ὑπὸ τοῦ πνεύματος ἀντεχομένων πρὸς τὴν ἀνάβασιν. Εἰ δὲ ὑψηλότερον τῶν κλιμάκων τὸ τεῖχος εἴη, ἐπὶ ταῖς στυππίναις προϋποτίθενται κλίμαξιν, αἳ κατασκευάζονται διὰ πλοκῆς καὶ ῥαφῆς δεσμούμεναι, δικτυωταὶ οὖσαι ὡς τὰ λεγόμενα σάρκινα· εἰς δὲ τὰ ἄκρα αὐτῶν ἄγκιστρα προσβάλλονται, ἵνα ἀπὸ τῶν προϋποτεθέντων δερματίνων ἐπιρριπτόμενα ἐπιλαμβάνηται τῶν προμαχώνων καὶ οὕτως τὴν ἐπὶ τὸ τεῖχος ἀνάβασιν τοῖς βουλομένοις διευθετίζωσι.

'He who wishes to sack cities effortlessly, according to Philo of Athens [*sic*], must make the attack sudden, particularly at vintage time or while a festival is being celebrated outside the city; for by seizing many who are outside at that time he will possess the city (when it is) easy to capture or subject to tribute – getting this in exchange from the remaining inhabitants because of their affection for or kinship with those (captured). If we wish to take the city by stealth at night, (we must act) while the citizens are unaware of our coming and not expecting it, when winter has taken hold (and) when because of the freezing weather the majority of them are gathered together in their houses and unprepared for a battle, or while a public festival is being celebrated in(side) the city and the populace is relaxing with ritual games or lethargic from drunkenness. We will bring against the wall hide ladders that we have made; they are stitched just like wineskins and, blocked in round the stitches with grease, filled up so as not to deflate; for when they are inflated and full of air (and) prevented from deflating, they are bound to be upright, held firm by the air for the ascent. If the wall be higher than the ladders, they are placed beneath oakum ladders, which are constructed by being bound together with plaiting and stitching; they are in net form, like the so-called soldiers'-packs; to the tops of them hooks are attached, in order that, thrown from the leather (ladders) placed beneath, they catch on the battlements and so facilitate the ascent of the wall for those wishing (to make it)'.

See Ph.'s D2–4 [*96.28–37*] and D73 [*102.12–19*].

6. 259.1–13 (47.1–14): Γενήσεται δὲ εὔχρηστος γέφυρα καὶ μόνη ἡ ῥηθεῖσα διαβάθρα, ὅταν ἀδυνατῶμεν χωννύειν τάφρους εὐρείας ἢ βαθείας ⁻ε καὶ ὑδάτων μεστάς, εἰ σύμμετρος μήκει πρὸς τὰ τῶν τάφρων γένηται πλάτη καί, ὡς ἐμάθομεν, εὐλύτως ἐπιζευχθῇ, χωστρίδος ἔμπροσθεν χελώνης πάρορθος ἀνισταμένη, ὑπὸ σχοινίων ὄπισθεν ἑλκομένη καὶ ἐπιδιδομένη ἢ ὑπὸ τῶν ῥηθέντων ἄνωθεν πολυσπάστων, ὅταν ἔξογκον ἐπὶ τοσοῦτον τὸ μέγεθος καὶ ἡ φορὰ τοῦ βάρους τῆς διαβάθρας εἴη· φερομένη γὰρ ὑπὸ τῆς χελώνης καὶ προσελθοῦσα τῷ ἐμπροσθίῳ χείλει τῆς τάφρου, τὰ ἐκ τῶν ὄπισθεν προσχαλῶνται σχοινία καὶ κατερχόμενον τὸ ἄκρον πρὸς τὸ ἀπεναντίον ἐπιτίθεται χεῖλος, καὶ γίνεται ὁδὸς ἀβλαβὴς τοῖς βουλομένοις εὐπροθύμως μετὰ λαισῶν διέρχεσθαι πηλῷ περὶ τὰ πλέγματα ἐπικεχρισμένων ἢ τέφρᾳ αἵματι ἀναμεμιγμένῃ κτλ.

'The aforementioned assault-bridge will also become a serviceable bridge by itself, whenever we are unable to fill in trenches (because they are too) broad or deep and full of water, provided (such a bridge) be commensurate in length to the widths of the trenches and, as we learned, yoked loosely; standing almost vertical at the front of a filler tortoise, it is dragged (up) and let down by ropes at the back or by the pulleys mentioned above, whenever the size and the burden of the assault-bridge is sufficiently weighty; for, carried by the tortoise and approaching the front lip of the trench, the ropes at the back are slackened and the top, coming down, is set on the opposite lip, and it becomes a harm-free route for those wishing to cross very eagerly with laisai smeared around their plaitings with clay or with ash mixed in with blood etc.'.

See Ph.'s D11 [*97.30–34*] and D35 [*99.26–28*]. (However, the substantive proposal here – adding a boarding-bridge to a filler tortoise – is not in Ph., or anywhere else extant.)

7. 260.5–261.2 (48.1–13): Οἱ δὲ περὶ Φίλωνα τὸν Βυζάντιον, πρὸς τὰς τοιαύτας τάφρους χελώνας προθέμενοι χωστρίδας, πρὸς αὐτὰς σχεδίας ἐπιζευγνύουσι, καὶ πρὸς ὃ ἂν βούλωνται μέρος τοῦ τείχους τοὺς στρατιώτας προσάγουσι, σιδηροῦς προσηλοῦντας πασσάλους, οἳ στομωθέντες καὶ ὀξυνθέντες εἰς τὰς συμβολὰς καὶ συμφύσεις λιθίνων τε καὶ πλινθίνων ὑπεισέρχονται τειχῶν, σιδηραῖς σφύραις ὑπὸ τῶν ἀναβαινόντων τυπτόμενοι, καὶ ἀγκίστροις ἅπερ ἐπὶ σχοινίων σὺν τοῖς δικτύοις ἅμα πρὸς τὰς ἐπάλξεις ἐπιρριπτούντων ἐπιδρασσομένοις, ὥστε μὴ χαλεπαίνειν πρὸς τὴν ἀνάβασιν τοὺς ἐθισθέντας μάλιστα στρατιώτας· τοιαύτῃ γὰρ μεθόδῳ Αἰγύπτιοι χρώμενοι τὰς ἀπαρασκεύους καὶ ἀνισχύρους πόλεις καὶ ταπεινὰς πρὸς ὕψος πολιορκεῖν ῥᾳδίως εἰώθασιν.

'Philo of Byzantium et al., applying filler tortoises to such trenches, yoke "rafts" to them, and to whatever part of the wall they wish they convey soldiers, to nail iron pegs which, tempered and sharpened, are inserted into the joints and seams of both stone and brick walls, struck with iron hammers by those climbing up; and (the climbers) use hooks that get a grip for ropes casting at the same time, with nets, onto the parapets, so as to present no difficulty in the ascent for the most experienced soldiers; for Egyptians, using such a method, were accustomed to besiege easily cities unprepared and weak and low in (wall-)height'.

See Ph.'s D11 [*97.30–34*] and D74–75 [*102.19–27*].

8. 261.3–10 (49.1–9): Δεῖ δὲ ἐπὶ πάσαις ταῖς κλίμαξι καὶ ταῖς ἐπὶ τῷ τείχει γινομέναις ἀναβάσεσιν ἢ ἐπιβάθραις σκοπεῖν τὰ προκαταρτιζόμενα ἐκ λίνου παχέα ἀμφιβλήστρα· ἐπιρριπτόμενα γὰρ καὶ ἀθρόως πάλιν ἐπισυρόμενα τοὺς ἀνερχομένους ἢ ἐπιβαίνοντας ζωγροῦσι καὶ τοῖς ἐχθροῖς ὑποχειρίους παριστᾶσι. Καὶ πρὸς μὲν ταῖς κλίμαξιν ἀβλαβῆ τὴν ἀνάβασιν παρεφυλαξάμεθα, ὡς ἐπὶ τῶν ἀγκυρωτῶν δοκίδων

καὶ τῶν κατερχομένων βαρῶν ἀνωτέρω τεχνησάμενοι διωρίσαμεν. (Πρὸς δὲ τὰς ἐπιβάθρας κτλ.)

'With all ladders and ascents which occur on the wall, or (when using) boarding-bridges, it is necessary to look out for thick wrappings pre-prepared out of linen; for when thrown out and suddenly dragged back they capture alive those coming up (the ladders) or crossing (the bridges) and render them under enemy control. And we (already) safeguarded the ascent on the ladders, just as we earlier devised and prescribed (what to do) against hooked poles and weights falling down'.

See Ph.'s C65 [*95.39–44*] and A79 [*85.35–39*].

9. 276.15–17 (58.8–10): εὐχερῶς τὰς τῆς Ἄγαρ μάλιστα λήψονται πόλεις, αὐτοὶ μηθὲν ἀνήκεστον ὑπὸ τῶν θεολέστων ἐχθρῶν πάσχοντες.

'(If commanders act carefully and honorably) they will easily capture cities, especially those of (H)agar, while themselves suffering nothing ruinous at the hands of the god-damned enemy'.

See Ph.'s own closing remarks: D111 [*104.40–42*].

APPENDIX 4

THE WALLS OF SKOTOUSSA

While it would be foolish to hope to identify a "typical" set of city-walls in Ph's time (not only, and indeed not primarily, because he himself sought to distinguish between a multiplicity of types), one whose constituent elements are on display in a contemporary document that has survived by the processes of random chance is instructive to contemplate. It confronts the orderly realm of Philonian ideals with the idiosyncracies of an actual enceinte that has had to accommodate topographical complexity. I summarize here the salient points of the *editio princeps* (and associated analysis): V. Missailidou-Despotidou [hereinafter M–D], 'A Hellenistic inscription from Skotoussa (Thessaly) and the fortifications of the city', *ABSA* 88 (1993) 187–217. See also SEG 43.311: initial report of that publication, with textual improvements, extra comment and bibliography.

The stone is opisthographic (M–D's side A and side B are here redesignated I and II, to avoid any confusion with the numeration of Ph.), side I much degraded from its use as a threshold. It begins with a fragmentary decree of an unnamed polis (I.4: ἐψαφίξατο ἁ πόλις), before – apparently from about I.21 onwards – putting on display the results of a survey of property adjacent to the walls (I.9: κτᾶσις πὸτ τοῖς τειχέεσσι) which, evidently, the lost part of the decree has ordained. More exactly, two such surveys: the first (as reported) and longer one extramural, with numerous distances expressed in akainai (= ten-foot lengths) and, where necessary, extra feet; the second one intramural, with two shorter, quantified distances expressed in feet alone. These twin tasks have been undertaken by a group of at least ten pillars of the community as commissioners – with expert help, one would imagine, for the measuring process itself – who at one point refer to themselves in the first person plural: 'we determined' (I.61: ἐκρίνναμεν).

To universal satisfaction as far as I am aware, M–D has established, on multiple grounds, that the polis in question is Skotoussa in Pelasgiotic Thessaly (this despite two mentions, within the report itself, of 'the gate to Skotessa', the latter to be regarded as a related but distinct toponym: II.16 and 22). With prosopographical considerations in support, the key criterion is provenance: the find-spot of the stone itself. Mapping of the topographical indicators mentioned therein onto the scanty features (both natural and man-made) visible at the site which had already, since W. M. Leake's visit in 1809, been identified as Skotoussa results in compatibility, if not positive confirmation. Letter-forms suggest that the document was inscribed at some time during the early part of the second century. Historical factors corroborate and refine that date to the years between 197 (the Roman "liberation" of Thessaly from Philip V) and c.185; perhaps, more exactly, before 192–189 (Antiochus III's war of rebellion against Rome).

The walls of Skotoussa as of (?)367/6 are briefly mentioned in the context of a notorious blood-bath which had seen the mercenaries of Alexander of Pherai slaughter its citizens, throw their bodies into 'the trench in front of the walls' (τὴν πρὸ τῶν τειχῶν τάφρον), and plunder the town: Diod.Sic. 15.75.1; cf. Plut. *Pelop.* 29.7 and Paus. 6.5.2–3 (the last with a date one Olympiad-cycle earlier, and the

information that the site was deserted by his day). It must surely be the case, however, that the elaborate enceinte surveyed here, more than a century and a half later, was in whole or part a later construction.

The legible part of the commissioners' report, beginning at l.67, reads as follows (SEG 43.311 text; translation my own, though greatly indebted to M. D's):

[- - - -

[γο]ν, κὰτ τὸν δέκοτον πύργον, οὺς ἀ ὄμβασίς ἐστι, κὰτ τὸν ἑνκαιδέ-
[κο]τον πύργον ἂτ τοῖ ἐπικαμπίοι τοῖ κὰτ τὰν Περσείαν, κὰτ τὸν κα-
[…]ν ἐν τοῦ κάπου Δαιμονείου τοῖ Πλειστοξενείοι, κὰτ τὰν κράν-
[α]ν τὰν κὰτ τὰ Γοργίδαια, κὰτ τὰν ὄμβασιν τὰν κὰτ τὰ Γοργίδαια.

[- - - -

tower from the *epikampion*, the one by the Perseia; by the
(?) in the garden of Daimoneios the son of Pleistoxeneios; by the fountain
75 by the Gorgidaia; by the way-in by the Gorgidaia.

*

The loss and/or illegibility of both the substantive section of the decree and the first part of the extramural report can be compensated for by the clarity of the shorter intramural report, II.56–75. In particular, the phrase ἐκρίνναμεν ἄτ τοῖ τείχεος ἀπεχέμεν πόδας δεκαδύος (II.57–58) establishes that the two distances specified – this twelve-foot one, explicitly, and the twenty-foot one ordained later (II.62) – are distances away from the wall; see the Comm. to A10 **Ἀπεχέτω**. These distances delineate space, immediately adjacent to the wall on the inside, which, whether or not it is devoted to intramural pasturage (II.60 and 63), is in public ownership (II.60: δάμοσσος); and the reason for doing this can hardly be other than the one identified in the *editio princeps* – to keep such ground clear for the needs of military defence. (Besides M–D's own observations to that effect, see already D. M. Lewis, 'Public property in the city', in O. Murray and S. Price (ed.), *The Greek City from Homer to Alexander* (Oxford 1990) 244–263, at 253; reprinted in P. J. Rhodes (ed.), *David M. Lewis: selected papers in Greek and Near Eastern history* (Cambridge 1997) 60–76, at 67.) Accordingly, that same objective must be seen as underlying the extramural report also, a much longer and more detailed one. Here too the distances given are not, as they might at first sight have appeared to be, distances along the wall but distances outwards from it. M–D's tabulation of these distances (203) shows a variation between 42 and 100 feet, with 60 feet as the most frequently mentioned distance and some two-thirds of them falling in the 50–65 feet range; note, however, that with the reading δεκαέξ (rather than her [πέντ]ε) in I.70, the top end of that range rises sharply to 160, and thereby underlines even further the striking variation we see here. It can be accounted for, in M–D's reasonable view (213), only in part by 'the different defensive requirements of each site, with space for extra outworks allowed in the areas less naturally defensible'; one must assume also that 'the scheme was affected by the existence of private fields lying outside the wall, which presented an irregular boundary line'. This assessment, moreover, accords well with the nature and tone of the report, which is anything but an undifferentiated land-grab, expropriating property willy-nilly for the public domain. Rather, as its grammar and syntax shows (204), the commissioners have discharged a dual task, where ownership was concerned. They have stated as established fact what was precisely that (e. g. I.70–72, II.58–60), and they have adjudicated when clarification was needed (e. g. I.74–76).

In M–D's analysis (216–217) of the correlation between the enceinte as described here and the archaeological remains still discernible at Skotoussa, her frustration at the inconclusive nature of the latter is plain to see. In particular, no enlightenment is to be had on the topographical and structural relationship – implied by the survey to be a close one – between the circuit-wall itself and the wall or walls surrounding the akropolis (II.32–33, 61–62), the latter long since vanished. More broadly, though, a key consideration is the ποταμός briefly mentioned in I.75. If this

river is to be identified, as M–D contends, with the present-day Plantanorema, this fact anchors that point in the extramural survey to the north or north-east portion of the enceinte (reckoned by Stählin to be some three and a half kilometres in extent); and on that basis other, more or less persuasive correspondences add up to the view that the commissioners proceeded clockwise, starting from the south-west corner.

Their report's principal point of reference throughout, as is clear, is the tower (πύργος), typically referred to by a topographical phrase or mnemonic, many of which then give rise to a numbered sequence (the longest 11: II.72–73). No fewer than 44 towers are so listed, and given the loss of the first third or so of the extramural report it is obvious that the overall total number in the enceinte was considerably larger. Only in a single instance is the intrinsic character of a tower referred to: the 'three-storey' one of II.63–66. If that aspect of it was enough to give it instant recognition, most (if not necessarily all) of the other towers are likely to have been smaller and simpler, particularly the sequences of them which punctuated the curtains. M–D 210 makes the not unreasonable assumption that the "default" shape of Skotoussa's towers is rectangular, but I would venture to dispute her view that the one mentioned at II.47–48 was 'partly curved'; in the phrase τᾶς καμπᾶς τοῖ ὑστέροι πύργοι used there, the term καμπά is best translated 'kink' (see below).

The curtains themselves, here called μεσαπύργια, are mentioned far more sparingly than the towers: see merely I.71, 72, 78, II.1, 5, 8, 11, 14–15, 21, 24, 25, 29, 34, 39, 41, 44, 49, 50, 52 and 53–54. Even if we add in a few phrases where that noun is, or might be, implicit (II.2–3, 16, 31–32, 45–46), it remains true that the enceinte's curtains *per se*, while in plain fact they must have intervened between almost all given pairs of towers (except e. g. those at gates, on which see below), did not need to function as primary points of topography in this survey, if towers filled that role. Where it was deemed necessary or important to mention a μεσαπύργιον, it is mentioned; where some other distinctive feature of the circuit – or else a natural landmark (river, crag, etc.) – was thought more appropriate, this takes precedence. Thus, in particular, reference is made ten times to a καμπά: of a curtain in I.70–71, 72–73, 78, II.1, 5–6, 34, 50–51 and 53–54 and of a 'wall' (evidently meaning the same) in II.66; of a tower in II.47–48 (see above). M–D translates καμπά as 'bend'. I have preferred 'kink', simply on the basis that with measurements of such precision as these commissioners are reporting – down to the last Thessalian foot – it seems necessary to envisage comparably precise points of changed orientation, within the stretch of (usually) a curtain, rather than undifferentiated bends or curves. (Other such angular shifts are flagged up by calling a tower or a curtain a 'corner' one (γουνιαῖος) – so I.73–74, 74–75, II.2–3, 15–16, 23, 30–31, 31–32, 54–55, 71, and cf. also ἐπὶ γουγ[ο]ῦ at II.37 – three of which are also described as 'turning', ἐπιστρέφοντος.) However, as regards the ἐπικάμπια mentioned on five occasions (II.23, 24, 36 twice, 73) M–D's position is entirely persuasive, and I render them 'jog' in the curtain; see the Comm. to A30 **τὰ ἐπικάμπια**.

Five gates (πύλαι) are mentioned, four of them by reference to where the roads which issue from them lead to: Aulon (II.46 and 55), (the) Enneapelethron (II.59–60), Skabai (II.6 and 68, i. e. in both reports) and Skotessa (II.16 and 22); the fifth, the Auroschadophoroi gate of II.57–58, appears to be a name of cult significance

(M–D 197). This last gate is flanked by a pair of towers, and one tower is mentioned in association with the Skabai gate (II.68). If any of these gates could be regarded as the main one, that fact is not alluded to.

There are also a number of lesser ways in and out: two πυλίδες ('posterns': II.44–45 and 68), five διεξόαι ('through-ways': II.29–30, 43–44, 49 – the first and third of these referring to the 'second' one at that location), and an ἐσδρομά ('sally-port': II.64) at the three-storey tower. Naturally, the substantive distinction between these terms – size, positioning, architectural type – is not explained; cf. M–D 210. In any event the number of exits expressly mentioned in this way is likely to bear no useful relation at all to how many there actually were; and the same point arises with the number of internal access-points – steps or the like – up to the wall-walk, if that is indeed what ὅμβασις (= ἀνάβασις: II.65, 72, 75) means. A systematic, comprehensive presentation of their τειχοποιία *per se*, as it stood in the early second century, is not what the citizens of Skotoussa had set out to produce here. Had it been otherwise, the results would have been beyond price (for students of Ph. and for others). What we get instead, as second best, is this set of snapshots of it.

APPENDIX 5

GRANARIES AND GRAIN-PRESERVATION IN *GEOPONICA* 2.27–30

Three of the four writers cited are of indeterminable date; 'Africanus' (2.28) is the well-known Sextus Julius Africanus, third century CE.

My underlining highlights material directly related to Ph.'s recommendations on these same subjects. See further in the Comm. to B6–10 [*86.39–87.8*] and 25–29 [*87.51–88.20*] *passim*.

2.27: *Περὶ σιτοβολίου ἤτοι ὠρείου, καὶ διαμονῆς σίτου.* Ταραντίνου ('*On a granary or horreum and the conservation of grain*: (the advice) of Tarantinus')

(1) Καλῶς ἀποκλείεται σῖτος ἐν ἀνωγείοις, τὸ φῶς ἀπὸ ἀνατολῆς ἔχουσι· προσπνείσθω δὲ ὁ τόπος μετρίως ἀπὸ βορρᾶ καὶ ζεφύρου, καὶ ἀπεστράφθω νότου καὶ τῶν τοιούτων ἀνέμων ('A fine way to shut away grain is in lofts, ones which admit light from the east; let the location be one where, in moderation, wind blows in from the north and west, but let it turn away from the south and winds of that sort').

(2) Ἐχέτω δὲ πυκνοὺς σωλῆνας, δι' ὧν ἥ τε θερμὴ ἀτμὶς ἐκπνέει, καὶ αὖρα ψύχουσα εἰσπνέει. Μὴ ἐχέτω δὲ νοτίδα, ἢ δυσωδίαν τινά, ἢ ἀναθυμίασιν ἀηδῆ. Μάλιστα δὲ ἱπποστασίων καὶ βουστασίων καὶ τῶν τοιούτων, καὶ πάσης θέρμης πόρρω ἔστω ('Let it have plenty of vents, through which the warm air can blow out and a fresh breeze blow in. It must have no dampness, or any unpleasant odour, or disagreeable fumes. Ideally it should be far away from stables and cowsheds and such places, and from heat of every kind').

(3) Χριέσθωσαν δὲ οἱ τοῖχοι πηλῷ μιχθέντι θριξὶν ἀντὶ ἀχύρων, ἔπειτα τῇ λεγομένῃ λευκαργίλλῳ γῇ ἔσωθεν καὶ ἔξωθεν ('Let the walls be coated in mud mixed with hair – instead of chaff – and then with the so-called white-clay earth, inside and outside').

(4) Μετὰ δὲ ταῦτα σικύου ἀγρίου τὰς ῥίζας καὶ τὰ φύλλα ἀποβρέξας εἰς ὕδωρ ἡμέρας δύο, καὶ φυράσας τῷ ὕδατι τὴν καλουμένην ἀμμοκονίαν, ἐπιμελῶς τὰ ἔνδον χρίε ('Then soak the roots and leaves of wild cucumber in water for two days, mix the so-called cement with the water, and carefully coat the interiors').

(5) Τινὲς δὲ εἰς τὴν κονίασιν καὶ κτηνῶν οὖρον μιγνύουσιν, ὡς φθορορποιὸν ὑπάρχον τῶν ζώων. Καὶ τὴν ὀστρακοκονίαν δὲ τὴν ἐπὶ τοῦ ἐδάφους χριομένην τῷ οὔρῳ βρέχουσι ('Certain people also mix the urine of livestock into the cement, as being something injurious to animal pests. They also steep in urine the concrete with which the floor is coated').

(6) Τινὲς τέφραν κληματίδων δρυὸς ἐμπάσσουσι τῷ σίτῳ, ἄλλοι δὲ βόλβιτον ξηρόν, τινὲς ἀψινθίου ἢ ἀβροτόνου ξηρὰ κλωνία ἐντιθέασιν, ἔτι γε μὴν καὶ φύλλα ξηρὰ τῆς ἀειζώου βοτάνης ('Certain people sprinkle the ash of oak branches over the grain, others a dry cow-pat; some put in dry sprigs of wormwood or southernwood, and also dry leaves of the houseleek').

(7) Κάλλιον δὲ τὴν ἀμμοκονίαν ἀμόργῃ βρέχειν. Αὕτη γὰρ καὶ πάντα τὰ θηρία διαφθείρει, καὶ τὸν σῖτον στερεώτερον καὶ πυκνότερον ποιεῖ. Διὸ τινες ἐφ' ἡμισείας τὴν ἀμόργην ἐψήσαντες καταρραίνουσι τοὺς τοίχους, εἶτα ἐάσαντες ξηρανθῆναι ἀποτίθενται τοὺς κάρπους ('Better is to wet the cement with olive-pressing fluid:

this destroys all vermin, and it also makes the grain firmer and denser. That is why certain people boil down the olive-pressing fluid by half and spatter the walls with it; then after letting it dry they store away the crops').

(8) Πάντων δὲ κάλλιον γῆν προετοιμάζειν ἐψυγμένην ἀργιλλώδη, ἢ ῥοιῶν φύλλα ξηρὰ καὶ σεσησμένα· καὶ ὅταν ὁ σῖτος ἀποτεθῇ, εἰς ἕκαστον σίτου μέδιμνον ἐμπάσσειν χοίνικα τῆς ἀργιλλώδους γῆς ἢ τῶν φύλλων ('Better than everything is to prepare some dried clayey earth, or dry and sifted pomegranate leaves; and when the grain is being stored away, to mix into each medimnos of grain a choinix of the clayey earth or the leaves').

(9) Χρησιμώτατον δὲ κόνυζαν ἡμιψυγῆ ὑποστρωννύειν τοῦ σίτου, καὶ μετὰ δέκα πάλιν μεδίμνους σίτου ἐπιβάλλειν τὴν κόνυζαν, καὶ πάλιν σῖτον ἕως ἂν ἅπας ἀποτέθῃ. Ὁ γὰρ οὕτως ἀποτεθεὶς οὐ μόνον εἰς πολλὰ ἔτη ἄσηπτος διαμένει, ἀλλὰ καὶ ἀποσώσει τὸν αὐτὸν σταθμὸν ἐπὶ τῇ ἀρτοποιίᾳ ('Most/very useful is to spread semi-dried fleabane on the ground under the grain, and after ten medimnoi of grain to put in the fleabane again, and grain again until all is stored away. Grain thus stored away not only remains imperishable for many years but also retains the same weight in breadmaking').

(10) Φύσει δὲ ὁ σῖτος παλαιούμενος σφόδρα μελαίνεται, καὶ πικρὸς γίνεται, ὅθεν δεῖται τῆς προειρημένης ἐπιμελείας ('As grain ages it naturally turns very black, and becomes bitter – hence it needs the care aforementioned').

2.28: *Ὥστε καὶ αὔξησιν λαμβάνειν τὰ ἀποκείμενα ἐν τοῖς ὡρείοις σπέρματα.* Ἀφρικανοῦ ('*How the seeds stored away in the granaries can undergo an augmentation*: (the advice) of Africanus')

(1) Ὁ σῖτος ἐπίμετρον ποιήσει οὕτως· νίτρον καὶ ἀφρόνιτρον λειώσας καὶ ἀναμίξας γῇ λεπτῇ, ἐπίβαλλε τοῖς σωροῖς. Φυλάξει δὲ αὐτοὺς καὶ ἀκόπους τὸ τοιοῦτον ('The grain will make an increase as follows: grind nitron and afronitron to a powder, mix them with fine soil, and insert it into the heaps. Such a step will also keep (the crops) unbruised').

2.29: *Ὥστε μύρμηκας μὴ ἅπτεσθαι σωροῦ γενημάτων.* Σωτίωνος ('*How to stop ants attacking a heap of produce*: (the advice) of Sotion')

(1) Μύρμηκες σωροῦ γενήματος οὐχ ἅπτονται, ἐὰν τὸν σωρὸν γῇ λευκῇ περιγράψῃς, ἢ ἄγριον ὀρίγανον περιθῇς ('Ants do not attack a heap of produce if you draw a line round the heap with chalk or put wild oregano round it').

2.30: *Περὶ διαμονῆς κριθῶν, ὥστε ταύτας ὑγιεῖς ἐν τοῖς ὡρείοις φυλάττεσθαι ἐπὶ πλεῖστον χρόνον.* Δαμηγέροντος ('*On the conservation of barleycorns, how to keep them healthy in the granaries for the longest time*: (the advice) of Damegeron')

(1) Τηρήσει τὰς κριθὰς ἀβλαβεῖς δάφνης καρποφόρου φυλλὰ ξηρά, καὶ πᾶσα τέφρα, μάλιστα δὲ ἡ ἀπὸ τῶν ξύλων τῆς δάφνης, ἐντιθεμένη ('Dry leaves of the fruit-bearing bay will keep barleycorns unharmed, and any ash from timbers, but especially of bay, that is placed in').

(2) Ὁμοίως δὲ τὰς κριθὰς καὶ ἡ ἀείζωος βοτάνη ξηραινομένη, καὶ μετὰ καλαμίνθης σὺν γύψῳ ἀναμιγνυμένη ταῖς κριθαῖς ('In a similar way houseleek, dried and mixed up with catmint and the addition of gypsum, will preserve barleycorns').

(3) Ἔνιοι δὲ ὄξους ἀγγεῖον πλωρώσαντες καὶ πωμάσαντες, ἐν μέσῳ τιθέασι τῶν κριθῶν ('Some people fill a vessel of vinegar, put a lid on it, and place it in the middle of the barleycorns').

(4) Εἰδέναι δὲ χρή, ὅτι αἱ κριθαὶ παλαιούμεναι πικραὶ γίνονται ('One should be aware that barleycorns become bitter as they age').

GAZETEER

This is simply a summary listing of almost all the sites adduced in the Commentary, with basic, contextual references concentrated here so as to avoid their cluttering up the notes ad locc. I omit Alexandria, Athens, Carthage, Jerusalem and Sparta, for which such an entry seems otiose, and Sirynx for the opposite reason (unlocatability: see the Comm. to A69 under **Ὀρυκτέαι**).

The default form of a toponym is usually the one used in the *Barrington Atlas* and its *Directory* – where, as again here, consistency has been less than absolute.

References to Lawrence are to his own *Index of place-names and gazeteer of monuments*. (A Lawrence reference in parentheses indicates that it is simply a cross-reference to discussion in his text, without archaeological enhancement.)

Abdera: BA map 51 grid D3, with BA(D) 2.772; PECS 3–4; Lawrence 460; IACP 872–875 no.640; KP 1.6; BNP 1.16 (Abdera (1)); OCD 1

Abydos: BA map 51 grid G4, with BA(D) 2.772; PECS 5; (Lawrence 460); IACP 1002–1003 no.765; KP 1.22–23; BNP 1.38 (Abydos (1)); OCD 1–2

(Agrigentum: see Akragas)

Agrinion: BA map 55 grid A3, with BA(D) 2.819; PECS 18; (Lawrence 60); IACP 382 no.142; KP 1.144–145; BNP 1.390 (Agrinium)

Aigeira: BA map 58 grid C1, with BA(D) 2.876; (Lawrence 127–128); IACP 479–480 no.230; KP 1.1522–1523; BNP 1.194–195 (Aegira)

Aigosthena: BA map 58 grid E1, with BA(D) 2.876; PECS 21; Lawrence 461; IACP 462–463 no.224; KP 1.165; BNP 1.198 (Ae-); OCD 18 (Ae-)

Ainos: BA map 51 grid G3, with BA(D) 2.773; PECS 22; IACP 875–877 no.641; KP 1.177; OCD 23 (Ae-)

Akanthos: BA map 51 grid B4, with BA(D) 2.773; PECS 23; IACP 823–824 no.559; KP 1.215; BNP 1.47–48; OCD 2 (Ac-)

Ake: BA map 69 grid B4, with BA(D) 2.1058 (Ake/Ptolemais); PECS 742 (Ptolemais (Acre)); KP 4.1234 (Ptolemais(8)); BNP 12.174 (Ptolemais(8) Akko); OCD 1234 (Ptolemais(1)))

Akragas: BA map 47 grid D4, with BA(D) 1.712; PECS 23–26; Lawrence 461 (Ac-); IACP 186–189 no.9; KP 1.219–220; BNP 1.110–111; OCD 9 (Ac-)

Akrocorinth: BA 58 grid D2, with BA(D) 2.876 (Akrokorinthos); PECS 240 (under Corinth); Lawrence 465–466 (under Corinth); IACP 467 (Korinthos); KP 3.303 (Korinthos); BNP 3.797 (Corinthus); OCD 374–375 (Corinth)

Alesia: BA map 18 grid B2, with BA(D) 1.263; PECS 35–36; KP 1.241; BNP 1.465; OCD 55

Alexandreia Troas: BA map 56 grid C2, with BA(D) 2.844 (Antigoneia/Alexandria Troas); PECS 39; Lawrence 461; KP 1.245; OCD 60–61 (Alexandria(7) Troas)

Alinda: BA map 61 grid F2, with BA(D) 2.938; PECS 40–41; Lawrence 461; IACP 1111 no.871; BNP 15.991–992; OCD 62

Ambrakia: BA map 54 grid C3, with BA(D) 2.805 (Ambrac-); (Lawrence 461 (Ambrac-)); IACP 354–356 no.113; KP 1.1533–1534; BNP 1.570–571 (Ambrac-); OCD 69 (Ambrac-)

Ambrakos: BA map 54 grid C3, with BA(D) 2.805 (Ambracus); PECS 48 (Ambrakos (Phidokastro)); (Lawrence 461 (Ambracus)); IACP 352 (no number); KP 1.1534 (Ambrakia); OCD 69 (Ambracia)

Amphipolis: BA map 51 grid B3, with BA(D) 2.773; PECS 51–52; Lawrence 462; IACP 819–820 no.553; KP 1.314–315; BNP 1.605; OCD 73

Andetrium: BA map 20 grid D6, with BA(D) 1.288; BNP 1.676
Andros: BA map 60 grid A4, with BA(D) 2.921; PECS 57; Lawrence 464 (Ayios Petros); IACP 736–737 no.473; KP 1.1538–1539; BNP 1.689; OCD 86
Aphytis: BA map 50 grid D4, with BA(D) 2.762; PECS 70; IACP 825–826 no.563; BNP 1.837
Apollonia: BA map 38 grid C1, with BA(D) 1.560 (Apollonia/Sozousa); PECS 72 (Apollonia later Sozousa); Lawrence 462; IACP 1236 (no number)
(Araxos: see Teichos Dymaion)
Argos: BA map 58 grid D2, with BA(D) 2.877; PECS 90–91; Lawrence 462; IACP 602–606 no.347; KP 1.540–543; BNP 1.1070–1073; OCD 149–150
Arkesine, Amorgos: BA map 61 grid B4, with BA(D) 2.939; PECS 50–51 (Amorgos); IACP 734–735 no.472; KP 1.1534–1535 (Amorgos); OCD 72 (Amorgos)
Asine: BA map 58 grid D2, with BA(D) 2.878; PECS 100–101; Lawrence 463; IACP 600 (no number); KP 1.638; BNP 2.158 (Asine (2)); OCD 184
Assos: BA map 56 grid C3, with BA(D) 2.844; PECS 104–105; Lawrence 463; IACP 1004–1005 no.769; KP 1.1542–1544; BNP 2.184–185; OCD 187
Attaleia: BA map 65 grid E4, with BA(D) 2.998 (Attalea); PECS 111; (Lawrence 463); KP 1.786–787; BNP 2.302 (Attaleia (1)); OCD 201–202
Aulis: BA map 59 grid B1, with BA(D) 2.906; PECS 126–127; IACP 433 (no number); KP 1.754–755; BNP 2.377–378; OCD 209
Avaricum: BA map 14 grid H1, with BA(D) 1.201; PECS 129–130; KP 1.785; BNP 2.422
Babylon: BA map 91 grid F5, with BA(D) 2.1302; (Lawrence 464); BNP 2.441–442; OCD 218
Barke: BA map 38 grid B1, with BA(D) 1.560; (Lawrence 41 (Barca)); IACP 1421–1421 no.1025; KP 1.826; BNP 2.511
Byzantium: BA map 53 grid A2, with BA(D) 2.797; PECS 177–179; (Lawrence 464); IACP 915–918 no.674 (Byzantion); KP 1.981–982; BNP 2.846–858; OCD 256
Cales: BA map 44 grid F3, with BA(D) 1.647; PECS 185–186; KP 1.1014; BNP 2.952 (Cales (2)); OCD 264
Carthago Nova: BA map 27 grid E4, with BA(D) 1.443; PECS 202–203; KP 1.1063; BNP 2.1136; OCD 285
Casilinum: BA map 44 grid F3, with BA(D) 1.647; KP 1.1065–1066; BNP 2.1151; OCD 286
Chalkedon: BA map 53 grid B3, with BA(D) 2.797 (Chalc-); PECS 216; (Lawrence 56 (Chalc-)); IACP 979–981 no.743 (Kalch-); KP 3.55–56 (Kalch-); OCD 303 (Chalc-)
Chalkis: BA map 55 grid F4, with BA(D) 2.821 (Chalc-); PECS 216–217; (Lawrence 64, 120, 124); IACP 647–649 no.365; KP 1.1125–1126 (Chalkis(1)); BNP 3.181–182 (Chalcs(1)); OCD 304 (Chalc-)
Chios: BA map 56 grid C5, with BA(D) 2.845; PECS 715–716 (Pityoussa); (Lawrence 466 (Delphinion), 467–468 (Emporion)); IACP 1064–1069 no.840; KP 1.1148; BNP 3.232; OCD 310–311
Corcyra: BA map 54 grid A2, with BA(D) 2.805; PECS 449–451 (Kerk-); IACP 361–363 no.123 (Kork-); KP 3.305–307 (Kork-); BNP 3.783–786; OCD 373–374
Corinth: BA map 58 grid D2, with BA(D) 2.879; PECS 240–243; Lawrence 465–466; IACP 465–468 no.227 (Korinthos); KP 3.301–305 (Korinthos); BNP 3.797–804 (Corinthus); OCD 374–375
Damascus: BA map 69 grid D2, with BA(D) 2.1060; PECS 256–257; KP 1.1471–1473 (Damaskos); BNP 4.54–57; OCD 410–411
Delion: BA map 55 grid F4, with BA(D) 2.822; (Lawrence 55, 161, 175); IACP 433 (no number); KP 1.1441–1442; BNP 4.208 (Delium (1)); OCD 426
Delos: BA map 61 grid A3, with BA(D) 2.940; PECS 261–264; Lawrence 466; IACP 738–740 no.478; KP 1.1444–1448; BNP 4.210–215; OCD 426–427
Delphi: BA map 55 grid D4, with BA(D) 2.822; PECS 264–267; (Lawrence 466); IACP 412–416 no.177 (Delphoi); KP 1.1450–1455 (Delphoi); BNP 4.216–226; OCD 427–428
Demetrias: BA map 55 grid D2, with BA(D) 2.822; PECS 267–268, cf. 665 (Pagasai); Lawrence 466–467; KP 1.1464; BNP 4.242–243; OCD 431

Didyma: BA map 61 grid E3, with BA(D) 2.940 (Didyma/Branchidai); PECS 272–273; KP 2.10–11; BNP 4.390–395; OCD 450
Dreros: BA map 60 grid E2, with BA(D) 2.922; PECS 283–284; IACP 1157–1158 no.956; KP 2.162; BNP 4.720 (Drerus)
Drilai: BA map 87 grid E4, with BA(D) 2.1231; KP 2.163; BNP 4.722
Dura-Europos: BA map 91 grid B3, with BA(D) 2.1303; PECS 286–287; Lawrence 467 (Dura); KP 2.179–181; BNP 4.744–745; OCD 554 (Europus)
Dyrrachium: BA map 49 grid B2, with BA(D) 2.752 (Dyrr(h)achium/Epidamnos); PECS 311 (Epidamnos); IACP 330–331 no.79 (Epidamnos/Dyrrachion); KP 2.187–188 (Dyrrachion); BNP 4.760–762; OCD 481
Echinos: BA map 55 grid D3, with BA(D) 2.822; (Lawrence 467((Echinus)); IACP 685 (no number); KP 2.194; BNP 4.785–786 (Echinos (1))
Eion: BA map 51 grid B3, with BA(D) 2.774; KP 2.214 (Eion(1)); BNP 4.860 (Eion(1)); OCD 73 (Amphipolis)
Elateia: BA map 55 grid D3, with BA(D) 2.822; PECS 295; Lawrence 467 (Elatea); IACP 416–417 no.180; KP 2.232–233; BNP 4.888–889 (Elateia(1)); OCD 495–496 (Elatea)
Elephantine: BA map 80 inset, with BA(D) 2.1173; PECS 871 (Syene); KP 2.242–243; BNP 4.912; OCD 499
Eleusis: BA map 59 grid B3, with BA(D) 2.907; PECS 296–298; Lawrence 467; IACP 637 no.362; KP 2.245–246; BNP 4.913–916; OCD 500
Ephesos: BA map 61 grid E2, with BA(D) 2.941; PECS 306–310; Lawrence 468 (Ephesus); IACP 1070–1073 no.844; KP 2.293–296; BNP 4.1024–1032 (Ephesus); OCD 509 (Ephesus)
Ephyra: BA map 54 grid C3, with BA(D) 2.806; PECS 310–311; IACP 345 no.96; KP 2.301; BNP 4.1038 (Ephyra (3)); OCD 510
Epidauros: BA map 58 grid E2, with BA(D) 2.880; PECS 311–314; (Lawrence 55); IACP 606–608 no.348; KP 2.303–305; BNP 4.1086–1089 (Epidaurus); OCD 514–515 (Epidaurus)
Eretria: BA map 55 grid D2, with BA(D) 2.823; PECS 315–317; Lawrence 468; IACP 651–655 no.370; KP 2.353–355; BNP 5.23–24 (Eretria (1)); OCD 534–535
Erythrai: BA map 56 grid C5, with BA(D) 2.846; PECS 317; Lawrence 468 (Erythrae); IACP 1073–1076 no.845; KP 2.367–368; BNP 5.54–55 (Erythrae (2)); OCD 537 (Erythrae)
Eumeneia: BA map 62 grid C5, with BA(D) 2.960 (Fulvia/Eumeneia); KP 2.427 (Eumenia); BNP 5.164–165 (Eumeneia (1))
Gabii: BA map 43 grid C2, with BA(D) 1.627; PECS 340–341; KP 2.651–652; BNP 5.630–631; OCD 597
Gaugamela: BA map 89 grid F4, with BA(D) 2.1274; KP 2.703; BNP 5.711; OCD 604
Gaza: BA map 70 grid E2, with BA(D) 2.1077; PECS 345–346; (Lawrence 60); KP 2.705–706; DCPP s.v.; BNP 5.715–716; OCD 605–606
Gela: BA map 47 grid E4, with BA(D) 1.715; PECS 346–347; Lawrence 469; IACP 192–194 no.17; KP 2.719–722; BNP 5.721–723; OCD 606
'Goritsa': BA map 55 grid D2, with BA(D) 2.823; PECS 361 (Goritsa ("Orminion")); Lawrence 469; IACP 689 (no number)
Gortyn: BA map 60 grid C2, with BA(D) 2.923; PECS 362–363; IACP 1161–1165 no.960; KP 2.855–856; BNP 5.942–945; OCD 623
Gortys: BA map 58 grid C2, with BA(D) 2.881; PECS 363; Lawrence 469; IACP 512 no.271; KP 2.856–857; BNP 5.945
Halasarna, Kos: BA map 61 grid E4, with BA(D) 2.941; IACP 755 no.500
Haliartos: BA map 55 grid E4, with BA(D) 2.823; PECS 374–375; IACP 441–442 no.206; KP 2.922; BNP 5.1109–1110 (Haliartus); OCD 643 (Haliartus)
Halieis: BA map 58 grid E3, with BA(D) 2.881; PECS 375; Lawrence 470; IACP 608–609 no.349; KP 2.922; BNP 5.1114; OCD 643
Halikarnassos: BA map 61 grid E3, with BA(D) 2.941; PECS 375–376; Lawrence 469 (Halic-); IACP 1115–1116 no.886; KP 2.922–924; BNP 5.1110–1112 (Halic-); OCD 643 (Halic-)
((H)arma: see Heleon)

Heleon: BA map 59 grid A1, with BA(D) 2.908; Lawrence 463 (Arma); IACP 434 (no number)
Heloros: BA map 47 grid G5, with BA(D) 1.715; PECS 382–383; Lawrence 470 (Helorus); IACP 195 no.18 (Heloron); KP 2.1014; BNP 6.116 (Heloros (2))
Heraia: BA map 58 grid B2, with BA(D) 2.881; IACP 513–514 no.274; KP 2.1032–1033
Herakleia-by-Latmos: BA map 61 grid F2, with BA(D) 2.941 (Heraclea ad Latmum); PECS 384–385 (Herakleia under Latmos); Lawrence 470 (Heraclea-by-Latmus); IACP 1126–1127 no.910 (Latmos/Herakleia); KP 2.1035; OCD 662 (Heraclea(2) by Latmus)
(Herakleia-by-Oita: see Herakleia Trachinia)
Herakleia Trachinia: BA map 55 grid C3, with BA(D) 2.830 (Trachis/Herakleia); PECS 386; Lawrence 470 (Heraclea-by-Oeta); IACP 710–712 no.430; KP 2.1034; OCD 663 (Heraclea(4) Trachinia)
Hierapolis: BA map 65 grid B2, with BA(D) 2.999; PECS 390–391; KP 2.1130; BNP 6.302 (Hierapolis(1))
Hierapytna: BA map 60 grid E2, with BA(D) 2.923; PECS 391–392; IACP 1165–1166 no.962; KP 2.1130–1131; BNP 6.303
Himera: BA map 47 grid D3, with BA(D) 1.715; PECS 393; (Lawrence 42, 56); IACP 198–201 no.24; KP 2.1147–1148; OCD 685
Hipponion: BA map 46 grid D4, with BA(D) 1.698 (Hipponion/Vibo Valentia); PECS 394; Lawrence 470 (Hipponium/Vibo Valentia); IACP 261–263 no.53; KP 5.1252–1253 (Vibo Valentia; BNP 15.388 (Vibo Valentia); OCD 689 (Hipponium)
(H)istria: BA map 22 grid F4, with BA(D) 1.337 (Histria); PECS 419 (Istros); Lawrence 470 (Histria); IACP 932–933 no.685 (Istros); KP 2.1477–1478; OCD 749–750 (Istria(1))
Hyampolis: BA map 55 grid D3, with BA(D) 2.824; IACP 418–419 no.182; KP 2.1255–1256; BNP 6.592–593
Hyllarima: BA map 61 grid G2, with BA(D) 2.941; PECS 400
Iasos: BA map 61 grid F3, with BA(D) 2.942; PECS 401–402; Lawrence 470–471 (Iasus); IACP 1117–1119 no.891; KP 2.1325–1326; BNP 6.687–688 (Iasos (5)); OCD 722–723 (Iasus)
Iliturgi: BA map 27 grid B4, with BA(D) 1.445
(Istros: see (H)istria)
Iotapata: BA map 69 grid B4, with BA(D) 2.1062; KP 2.1444; BNP 6.922–923; OCD 778 (Josephus)
Isaura: BA map 66 grid A2, with BA(D) 2.1016; PECS 415 (Isaura Vetus); Lawrence 471; KP 2.1458–1459
Itanos: BA map 60 grid F2, with BA(D) 2.923; PECS 420–421; IACP 1167–1168 no.965; KP 2.1485–1486; BNP 6.1019
Kadyanda: BA map 65 grid B4, with BA(D) 2.1000; PECS 429–430; BNP 2.870 (Ca-)
Kamarina: BA map 47 grid E5, with BA(D) 1.713; PECS 434–435; Lawrence 464 (Ca-); IACP 202–205 no.28; KP 3.96–97; BNP 2.1013–1015 (Ca-); OCD 271–272 (Ca-)
Kamiros, Rhodes: BA map 60 grid F3, with BA(D) 2.924; PECS 755–758 (Rhodes); IACP 1200–1202 no.996; KP 3.101–102; BNP 2.1022–1023 (Camirus); OCD 272 (Camirus)
(Kassandreia: see Poteidaia)
Katana: BA map 47 grid G3, with BA(D) 1.716; PECS 442 (Katane); (Lawrence 465); IACP 206–207 no.30 (Katane); KP 3.158–159 (Katane); BNP 3.8–9 (Catane); OCD 291 (Catana)
Kaunos: BA map 65 grid A4, with BA(D) 2.998 (Caunus); PECS 443–444; Lawrence 465 (Caunus); IACP 1120–1121 no.898; KP 3.171; BNP 3.39–41 (Caunus (2)); OCD 293 (Caunus)
Knidos: BA map 61 grid E4, with BA(D) 2.940 (Cnidus); PECS 459; Lawrence 495 (Cnidus); IACP 1123–1125 no.903; KP 3.260; BNP 3.489–490 (Cnidus); OCD 339–340 (Cnidus)
Knossos: BA map 60 grid D2, with BA(D) 2.924 (Knosos); PECS 459–460; IACP 1169–1170 no.967; KP 3.260–261 (Knosos); BNP 7.73–74; OCD 340 (Cnossus)
Koresia, Keos: BA map 58 grid G2, with BA(D) 2.883; PECS 446–447 (Keos); Lawrence 465 (Coressia); IACP 750–751 no.493; KP 3.184–186 (Keos); OCD 299 (Ceos)
Kos: BA map 61 grid E4, with BA(D) 2.943; PECS 465–467; (Lawrence 466 (Cos)); IACP 752–754 no.497; KP 3.312–315; OCD 387–388 (Cos)

Krane, Kephallenia: BA map 54 grid C5, with BA(D) 2.808; Lawrence 466 (Cr-); IACP 364 no.125 (Kranioi); KP 3.187 (Kephallenia); BNP 3.912 (Cranii); OCD 299 (Cephallenia)
Kydna: BA map 65 grid B5, with BA(D) 2.1001; Lawrence 466 (Cydna); Adam, *L'architecture* 115–165
Kynaitha: BA map 58 grid C1, with BA(D) 2.883 (Kynaitha(i)); PECS 473; (Lawrence 124 (Cynaetha)); IACP 516 no.278; KP 3.398; BNP 3.1051 (Cynaetha)
Kyzikos: BA map 52 grid B4, with BA(D) 2.788 (Cyzicus); PECS 473–474; IACP 983–986 no.747; KP 3.424–426; BNP 4.26–27 (Cyzicus); OCD 408 (Cyzicus)
Lamia: BA map 55 grid C3, with BA(D) 2.825; (Lawrence 471); IACP 712–713 no.431; KP 3.484–485; BNP 7.182–183 (Lamia (2)); OCD 790 (Lamia(2))
Larisa: BA map 55 grid C1, with BA(D) 2.825; PECS 485 (Larissa); IACP 695–697 no.401; KP 3.499–501 (Larisa (3)); BNP 7.251–253 (Larisa (3)); OCD 794 (Larissa)
Lebadeia: BA map 55 grid D4, with BA(D) 2.825; PECS 492; IACP 445–446 no.211; KP 3.526–527; BNP 7.339–341; OCD 1512 (Trophonius)
Lebedos: BA map 61 grid D1, with BA(D) 2.943; PECS 492–493; Lawrence 472; IACP 1080 no.850; KP 3.527; BNP 7.342
Lekythos, Torone: BA map 51 grid B5, with BA(D) 2.779; (Lawrence 472 (Lecythus)); IACP 847–848 no.620 (Torone); KP 3.551; BNP 7.379 (Lekythos (2)); OCD 1489 (Torone)
Leontini: BA map 47 grid G4, with BA(D) 1.716; PECS 497–498 (Leontinoi); Lawrence 472; IACP 209–211 no.33 (Leontinoi); KP 3.570–572 (Leontinoi); BNP 7.405–406; OCD 820–821
Leukas: BA map 54 grid C4, with BA(D) 2.808 (Leucas); PECS 506; IACP 364–366 no.126; KP 3.592–594; BNP 7.442–444 (Leucas); OCD 824 (Leucas)
Lilybaeum: BA map 47 grid A3, with BA(D) 1.716; PECS 509–510; Lawrence 472; KP 3.651; BNP 7.558–559; OCD 837
Mantineia: BA map 58 grid C2, with BA(D) 2.884; PECS 549–550 (Mantinea); Lawrence 473 (Mantinea); IACP 517–520 no.281 (Mantinea); KP 3.976–979; BNP 8.256–259 (Mantinea); OCD 894 (Mantinea)
Masada: BA map 70 grid G3, with BA(D) 2.1079; PECS 555–556; KP 3.1061; BNP 8.425; OCD 908
Massalia: BA map 15 grid E3, with BA(D) 1.223; PECS 557–558; (Lawrence 473 (Marseille/Massalia)); IACP 165–167 no.3; KP 3.1066–1068; BNP 8.441–445; OCD 909
Matropolis, Akarnania: BA map 54 grid D4, with BA(D) 2.809 (Metropolis); IACP 366–367 no.128
Megalopolis: BA map 58 grid C3, with BA(D) 2.885; PECS 564–565; Lawrence 473; IACP 520–522 no.282 (Megale polis); KP 3.1140–1142 (Megale polis); BNP 8.596–598; OCD 924
Megara: BA map 58 grid E2, with BA(D) 2.885; PECS 565; (Lawrence 473); IACP 463–465 no.225; KP 3.1143–1147; BNP 8.599–603 (Megara (2)); OCD 924–925
Meliteia: BA map 55 grid C2, with BA(D) 2.826; PECS 569–570; IACP 715 no.438; BNP 8.636–637 (Melitaea)
Messana, Italy: BA map 47 grid H2, with BA(D) 1.722 (Zancle/Messana); PECS 998–999 (Zankle); Lawrence 173 (Messina); IACP 233–236 no.51 (Zankle/Messana); KP 3.1246–1247; BNP 8.752–753 (Messana/Messene (1)); OCD 936
Messene, Peloponnese: BA map 58 grid B3, with BA(D) 2.885; PECS 573–574; Lawrence 473; IACP 561–564 no.318; KP 3.1250; BNP 8.753–758 (Messana/Messene (2)); OCD 937
Metapontum: BA map 45 grid E4, with BA(D) 1.679; PECS 574–575 (Metapontion); Lawrence 473; IACP 279–282 no.61 (Metapontion); KP 3.1259–1261; BNP 8.792–793; OCD 941
Milatos, Crete: BA map 60 grid E2, with BA(D) 2.925; IACP 1178 no.977; BNP 8.895 (Miletos(3))
Miletos: BA map 61 grid E2, with BA(D) 2.944; PECS 578–582; Lawrence 474 (Miletus); IACP 1082–1088 no.854; KP 3.1295–1298; BNP 8.884–895 (Miletos (2)); OCD 953–954 (Miletus)
Morgantina: BA map 47 grid E4, with BA(D) 1.718; PECS 594–595; IACP 215–216 no.37; KP 3.1427–1428; BNP 9.208–209; OCD 968
Motya: BA map 47 grid A3, with BA(D) 1.718; PECS 596; Lawrence 474; KP 3.1441; BNP 9.242; OCD 971
Myndos: BA map 61 grid E3, with BA(D) 2.944; PECS 602; Lawrence 474 (Myndus); IACP 1129 no.914; KP 3.1517–1518; BNP 9.410–411 (Myndus)

Mytilene: BA map 56 grid D3, with BA(D) 2.850; PECS 502–503; Lawrence 474; IACP 1026–1030 no.798; KP 3.1544–1546; BNP 9.471–474; OCD 993
Naryka: BA map 55 grid D3, with BA(D) 2.826; PECS 609; IACP 669 no.384; KP 3.1578; BNP 9.515–516
Naxos: BA map 61 grid A3, with BA(D) 2.944; PECS 611–612 (Naxos, Greece); Lawrence 470 (Himarru); IACP 760–763 no.507; KP 4.24–26 (Naxos(3)); BNP 9.571–574 (Naxos(1)); OCD 1003–1004 (Naxos(1))
Nisaia: BA map 58 grid E2, with BA(D) 2.885; PECS 510 (Limes, Attica); (Lawrence 475); IACP 463 (no number); KP 4.137; BNP 9.776–777 (Nisaia (2)); OCD 924 (Megara)
Numantia: BA map 25 grid C4, with BA(D) 1.398; PECS 635–636; KP 3.187–188; BNP 9.879; OCD 1024
Odessos: BA map 22 grid E5, with BA(D) 1.338; IACP 936 no.689; BNP 10.29–30 (Odessus)
Oiniadai: BA map 54 grid D5, with BA(D) 2.809; PECS 640; Lawrence 475 (Oeniadae); IACP 367–368 no.130; KP 4.258–259; OCD 1034 (Oeniadae)
Oinoanda: BA map 65 grid C4, with BA(D) 2.1002 (Oe-); PECS 640–641; Lawrence 475 (Oe-); KP 4.259; BNP 10.51 (Oe-); OCD 1034 (Oe-)
Olbia: BA map 23 grid E2, with BA(D) 1.354 (Borysthenes/Olbia); PECS 642–643 (Olbia Ukraine); Lawrence 475; IACP 936–940 no.690; KP 4.273; BNP 10.80–81 (Olbia (1)); OCD 1035
Olynthos: BA map 50 grid D4, with BA(D) 2.765; PECS 651–652; Lawrence 475 (Olynthus); IACP 834–836 no.588; KP 4.295–296; OCD 1038 (Olynthus)
Orongis: BA map 27 grid B4, with BA(D) 1.442 (Aurgi/Orongis)
Oropos: BA map 59 grid C1, with BA(D) 2.910; PECS 656; IACP 448–449 no.214; KP 4.349; BNP 10.240 (Oropus); OCD 1049 (Oropus)
Paestum: BA map 45 grid B4, with BA(D) 1.680 (Poseidonia/Paestum); PECS 663–665; Lawrence 476; IACP 287–289 no.66 (Poseidonia); KP 4.1079 (Poseidonia); OCD 1061
(Pagasai: see Demetrias)
Pale, Kephallenia: BA map 54 grid B5, with BA(D) 2.810; (Lawrence 476); IACP 369–370 no.132 (Paleis); KP 3.187 (Kephallenia); BNP 10.384; OCD 299 (Cephallenia)
Palibothra: BA map 6 grid F4, with BA(D) 1.89; KP 4.426–427; OCD 1069
Paros: BA map 61 grid A3, with BA(D) 2.945; PECS 677–679; Lawrence 476; IACP 764–768 no.509; KP 4.526–528; OCD 1084
Pednelissos: BA map 65 grid E3, with BA(D) 2.1003; PECS 683; 477; KP 4.580–581; BNP 10.676 (Pednelissus); Pisidia Survey Project s. v.
Peiraieus: BA map 59 grid B3, with BA(D) 2.910; PECS 683–684; KP 4.583–584 (Peiraios); OCD 1150 (Piraeus)
Pelusium: BA map 74 grid H2, with BA(D) 2.1120; KP 4.610; BNP 10.716–717; OCD 1102
Pergamum: BA map 56 grid E3, with BA(D) 2.851; PECS 688–692 (Pergamon); Lawrence 477 (Pergamon); IACP 1048 no.828 (Pergamon); KP 4.626–631 (Pergamon); BNP 10.754–772; OCD 1105–1106
Perge: BA map 65 grid E4, with BA(D) 2.1003; PECS 692–693; Lawrence 477 (Perga); IACP 1216 no.1003; KP 4.631–632; BNP 10.773–775; OCD 1106
Perinthos: BA map 52 grid B3, with BA(D) 2.790; (Lawrence 477 (Perinthus)); IACP 919–921 no.678; KP 4.638; BNP 10.785–786 (Perinthus); OCD 1107 (Perinthus)
Perusia: BA map 42 grid C2, with BA(D) 1.611; PECS 693; KP 4.664–665; BNP 10.657–658; OCD 1115–1116
Petelia: BA map 46 grid F3, with BA(D) 1.699; KP 4.668; BNP 10.865; OCD 1116
Pharos, Dalmatia: BA map 20 grid D6, with BA(D) 1.295 (Pharus); PECS 699; IACP 333–334 no.84; KP 4.716–717
Pharsalos: BA map 55 grid C2, with BA(D) 2.828; PECS 699–700; IACP 702–704 no.413; KP 4.717–718; OCD 1123 (Pharsalus)
Pherai: BA map 55 grid D2, with BA(D) 2.828; PECS 702–703; (Lawrence 65, 148 (Pherae)); IACP 704–706 no.414; KP 4.727–728; OCD 1124 (Pherae)

Philadelpheia (Amman): BA map 71 grid B2, with BA(D) 2.1088; PECS 703–704; KP 5.734 (Philadelpheia(3)); BNP 12.372 (Rabbath-Ammon)
Philippopolis (Plovdiv): BA map 22 grid B6, with BA(D) 1.338; PECS 706; Lawrence 477; IACP 894–895 no.655; KP 4.743–744; OCD 1130
Phleious: BA map 58 grid D2, with BA(D) 2.887; PECS 707 (Phli-); (Lawrence 57, 119, 128, 130, 178, 444 (Phleius)); IACP 613–614 no.355; KP 4.792–793 (Phleius); BNP 11.134–135
Phyle: BA map 59 grid B2, with BA(D) 2.911; PECS 710; Lawrence 477–478; KP 4.835; OCD 1145
Pisye: BA map 61 grid G3, with BA(D) 2.946; PECS 715; KP 4.871; BNP 11.302–303
Plataiai: BA map 55 grid E4, with BA(D) 2.828 (Plataea); PECS 717; Lawrence 478 (Plataea); IACP 449–451 no.216; KP 4.893–894; BNP 11.336–337 (Plataeae); OCD 1154 (Plataea)
(Poseidonia: see Paestum)
Poteidaia, subsequently **Kassandreia**: BA map 50 grid D4, with BA(D) 2.766; PECS 733–734; (Lawrence 478 (Potidaea)); IACP 838–839 no.598; KP 4.1092–1093; BNP 11.703–705 (Potidaea); OCD 1188 (Potidaea)
Potidaion, Karpathos: BA map 60 grid E4, with BA(D) 2.927; PECS 437 (Karpathos); IACP 746–747 no.489 (Karpathos); OCD 283 (Carpathos)
Priene: BA map 61 grid E2, with BA(D) 2.946; PECS 737–739; 478; IACP 1091–1093 no.861; KP 4.1131–1133; OCD 1209
Prinassos, Rhodian Peraia: not shown in BA, but one of the 'unlocated toponyms' for map 61 in BA(D) 2.951
Psophis: BA map 58 grid B2, with BA(D) 2.888; PECS 741; Lawrence 478; IACP 529 no.294; KP 4.1213; BNP 12.123–124
Pydna: BA map 50 grid C4, with BA(D) 2.766; PECS 745; IACP 806 no.544; KP 4.1246; BNP 12.237; OCD 1243
(Rabbatamana: see Philadelpheia)
Rhamnous: BA map 59 grid D2, with BA(D) 2.911; PECS 753; Lawrence 478 (Rhamnus); KP 4.1390 (Rhamnus); OCD 1274 (Rhamnus)
Rhegion: BA map 46 grid C5, with BA(D) 1.700; PECS 753–754; (Lawrence 479); IACP 290–293 no.68; KP 4.1392–1393; BNP 12.441–443 (Regium); OCD 1274 (Rhegium)
Rhodes (polis): BA map 60 grid G3, with BA(D) 2.927; PECS 755–758; Lawrence 479; IACP 1205–1208 no.1000 (Rhodos); KP 4.1421–1423 (Rhodos); BNP 12.570–574; OCD 1278–1279
Saguntum: BA map 27 grid E2, with BA(D) 1.447; PECS 782–783; (Lawrence 479); KP 4.1500–1501; BNP 12.867–868; OCD 1308–1309
Salamis, Athens: BA map 59 grid B3, with BA(D) 2.911; PECS 796–797 (Salamis Attica); IACP 637–639 no.363; KP 4.1505 (Salamis (1)); OCD 1309 (Salamis(1))
Salamis, Cyprus: BA map 72 grid D2, with BA(D) 2.1100; PECS 794–796; (Lawrence 479); IACP 1229 no.1020; KP 4.1505–1506 (Salamis (2)); BNP 12.880–881 (Salamis (2)); OCD 1309 (Salamis (2))
Salona: BA map 20 grid D6, with BA(D) 1.296; PECS 799; Lawrence 479; KP 4.1521; BNP 12.900–901; OCD 1312 (Salonae)
Samikon: BA map 58 grid B2, with BA(D) 2.888 (Samikon/Samia); PECS 802; Lawrence 479 (Samic-); IACP 541–542 (no number); KP 4.1532
Samos: BA map 61 grid D2, with BA(D) 2.946; PECS 802–903; Lawrence 479; IACP 1094–1098 nos.864–865; KP 4.1534–1537; BNP 12.930–937; OCD 1313–1314
Samothrake: BA map 51 grid F3, with BA(D) 2.778 (Samothrace); PECS 804–806 (Samothrace); Lawrence 479 (Samothrace); IACP 769–771 no.515; KP 4.1538; BNP 12.937–942; OCD 1314 (Samothrace)
Sardis: BA map 56 grid G5, with BA(D) 2.852; PECS 808–810; (Lawrence 63); KP 4.1551–1552 (Sardeis); BNP 12.984–995; OCD 1318–1319
Segesta: BA map 47 grid B3, with BA(D) 1.721; PECS 817–818; KP 5.71–72; BNP 13.197–198 (Segesta (1)); OCD 1340

Seleukeia in Pamphylia: BA map 65 grid F4, with BA(D) 2.1004

Seleukeia Pieria: BA map 67 grid B4, with BA(D) 2.1031; PECS 822; (Lawrence 451 (Seleucia P.)); KP 5.85 (Seleukeia(2)); BNP 13.213 (Seleukeia (2)); OCD 1340–1341 (Seleuceia(2) in Pieria)

Selge: BA map 65 grid F3, with BA(D) 2.1004; PECS 822–823; IACP 1213 (no number); KP 5.89–90; BNP 13.226

Selinous: BA map 47 grid B3, with BA(D) 1.731 (Selinus); PECS 823–825; Lawrence 480 (Selinus); IACP 220–224 no.44; KP 5.90–91; BNP 226–228 (Selinus (4)); OCD 1342–1343 (Selinus)

Sellasia: BA map 58 grid C3, with BA(D) 2.888; PECS 825–826; Lawrence 480; IACP 586–587 no.343; KP 5.92; BNP 13.231–232

Selymbria: BA map 52 grid C2, with BA(D) 2.792 (Sely(m)bria/Eudoxiopolis); IACP 921–922 no.679; KP 5.93; BNP 13.233

Sestos: BA map 51 grid G4, with BA(D) 2.778; PECS 830; IACP 909–910 no.672; KP 5.149; BNP 13.340–341; OCD 1356 (Sestus)

Side: BA map 65 grid F4, with BA(D) 2.1004; PECS 834 (Sibda); Lawrence 480; IACP 1216–1217 no.1004; KP 5.171–174; BNP 433–435; OCD 1363–1364

Sidon: BA map 69 grid B2, with BA(D) 2.1066; PECS 837; KP 5.175–176; DCPP s. v.; BNP 436–438; OCD 1364

Sikyon: BA map 58 grid D2, with BA(D) 2.889 (Sicyon/Demetrias); PECS 839–840; (Lawrence 480 (Sic-)); IACP 468–470 no.228; KP 5.186–188; BNP 13.431–433 (Sic-); OCD 1361 (Sic-)

Sillyon: BA map 65 grid E4, with BA(D) 2.1004; PECS 840; Lawrence 480; IACP 1213 (no number); KP 5.196; BNP 13.465–466 (Sillyum)

Sinope: BA map 87 grid A2, with BA(D) 2.1236; PECS 842; IACP 960–963 no.729; KP 5.209; BNP 13.497–498; OCD 1371–1372

Skotoussa: BA map 55 grid D2, with BA(D) 2.829; PECS 845–846; (Lawrence 480 (Scotussa); IACP 706–707 no.415; KP 5.237; BNP 13.102 (Scotussa)

Skyros: BA map 55 grid G3, with BA(D) 2.829 (Scyrus); PECS 846; (Lawrence 480); IACP 774 no.521; KP 5.240–241; BNP 13.148 (Sc-); OCD 1335 (Sc-)

Smyrna: BA map 56 grid E5, with BA(D) 2.852; PECS 847–848; Lawrence 480; IACP 1099–1101 no.867; KP 5.244; BNP 13.549–550; OCD 1376–1377

Soloi, Cilicia: BA map 66 grid F3, with BA(D) 2.1019; PECS 851; IACP 1220 no.1011; KP 5.262; BNP 13.614 (Soli (2))

Sounion: BA map 59 grid D4, with BA(D) 2.912; PECS 854–855; Lawrence 481 (Su-); KP 5.432–433 (Su-); BNP 13.949–950 (Sunium); OCD 1413 (Sunium)

Sphakteria: BA map 58 grid B4, with BA(D) 2.889; PECS 856–857; KP 5.307; BNP 13.370; OCD 1244 (Pylos)

Stratonikeia: BA map 61 grid G3, with BA(D) 2.947; PECS 861; KP 5.394–395; BNP 13.879–880 (Stratoniceia (2)); OCD 1406–1407 (Stratonicea)

Stratos: BA map 54 grid D4, with BA(D) 2.811; PECS 861–862; Lawrence 480–481 (Stratus); IACP 373 no.138; KP 5.395; BNP 13.880–881; OCD 2–3 (Acarnania)

(Syangela: see Theangela)

Syracuse: BA map 47 grid G4, with BA(D) 1.721; PECS 871–874; Lawrence 481; IACP 225–231 no.47 (Syrakousai); KP 5.460–469 (Syrakousai); BNP 14.39–53 (Syracusae); OCD 1420–1421

Taras (Tarentum): BA map 45 grid F4, with BA(D) 1.681; PECS 878–880; Lawrence 481 (Taranto); IACP 299–302 no.71; KP 5.518–520 (Tarentum(1)); BNP 14.138–141 (Taras (2)); OCD 1430–1431 (Tarentum)

Tauromenion: BA map 47 grid G3, with BA(D) 1.721 (Tauromenium); PECS 886–887; IACP 231–232 no.48; KP 5.544–545; BNP 14.169–171; OCD 1434 (Tauromenium)

Tegea: BA map 58 grid G3, with BA(D) 2.889; PECS 889–890; (Lawrence 455); IACP 530–533 no.297; KP 5.554–556; BNP 14.213–215 (Tegea (1)); OCD 1435

Teichos Dymaion: BA map 58 grid A1, with BA(D) 2.889; Lawrence 462 (Araxos)

Telos: BA map 61 grid E5, with BA(D) 2.947; IACP 776 no.525; KP 5.576–577; BNP 14.239–240

Tenos: BA map 60 grid B4, with BA(D) 2.928; Lawrence 463 (Avdo), 480 (Smovolon); IACP 776–778 no.525; KP 5.587–588; BNP 14.271–272; OCD 1440

Teos: BA map 56 grid D5, with BA(D) 2.853; PECS 893–894; Lawrence 481; IACP 1101–1102 no.868; KP 5.589–590; BNP 14.273–274; OCD 1440

Thasos: BA map 51 grid D3, with BA(D) 2.778; PECS 903; Lawrence 481; IACP 778–782 no.526; KP 5.651–654; BNP 14.368–371; OCD 1449

Theangela: BA map 61 grid F3, with BA(D) 2.947; PECS 869 (Syangela); Lawrence 481; IACP 1133 no.931 (Syangela); KP 5.658–659; BNP 14.376–377

Thebes, Boiotia: BA map 55 grid E4, with BA(D) 2.830 (Thebae); PECS 904–906 (Thebes Boiotia); Lawrence 481 (Thebes Boeotia); IACP 454–457 no.221 (Thebai); KP 5.664–669 (Thebai (1)); BNP 14.408–419 (Thebes (2)); OCD 1452–1453 (Thebes(1))

Thebes, Thessaly: BA map 55 grid D2, with BA(D) 2.830 (Thebai Phthiotides); Lawrence 481; IACP 717–718 no.444; KP 5.669–670 (Thebai (2)); BNP 14.419 (Thebes (3))

Theodosia: BA map 87 grid I2, with BA(D) 2.1247; PECS 907; IACP 951–952 no.707; KP 5.698; BNP 14.467

Thermopylae: BA map 55 grid D3, with BA(D) 2.830; PECS 910 (Thermopylai); Lawrence 481; KP 5.743–746 (Thermopylen); BNP 14.551–554; OCD 1464

Thessalonica: BA map 50 grid C3, with BA(D) 2.767; PECS 912–913 (Thessalonike); KP 5.761–763 (Thessalonike); BNP 14.575–576 (Thessalonica (1)); OCD 1467

Thisbe: BA map 55 grid D4, with BA(D) 2.830; PECS 915; Lawrence 482; IACP 458–459 no.223 (Thisbai); KP 5.769; BNP 14.588; OCD 1470

Thouria: BA map 58 grid C3, with BA(D) 2.890; IACP 565–566 no.322; KP 5.801–802 (Thu-); BNP 14.639–640 (Thu-); OCD 192 (Atargatis) and 938 (Messenian cults)

Torone: BA map 51 grid B5, with BA(D) 2.779; (Lawrence 482); IACP 847–848 no.620; KP 5.889–890; BNP 14.789–790; OCD 1489

Troizen: BA map 58 grid E3, with BA(D) 2.890; PECS 936; Lawrence 482 (Troe-); IACP 615–617 no.357; KP 5.984–985; BNP 14.958–959 (Troe-); OCD 1511 (Troe-)

Tunes: BA map 32 grid F3, with BA(D) 1.502; KP 5.1004; BNP 15.26–27; OCD 1520

Tyre: BA map 69 grid B3, with BA(D) 2.1067 (Tyrus); PECS 944 (Tyrus); Lawrence 482; DCPP 477–480; KP 5.1027–1029 (Tyros); BNP 15.71–74 (Tyrus); OCD 1523

Utica: BA map 32 grid F2, with BA(D) 1.502; PECS 949–950; (Lawrence 482); KP 5.1081–1083; BNP 15.143–144; OCD 1529–1530

Uxellodunum: BA map 14 grid H4, with BA(D) 1.210; PECS 950; KP 5.1084 (Uxellodunum (1)); BNP 15.148 (Uxellodunum (1)); OCD 1530

Xanthos: BA map 65 grid B5, with BA(D) 2.1005; PECS 996; Lawrence 483 (Xanthus); IACP 1141–1142 no.943; KP 5.1402; BNP 15.796–797 (Xanthus (3)); OCD 1579 (Xanthus)

Zarax: BA map 58 grid E4, with BA(D) 2.891; Lawrence 483; IACP 576–577 (no number); KP 5.1458; BNP 15.875 (Zarax (1))

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ÉCOLE FRANÇAISE
BIBLIOTHÈQUE
D' ATHÈNES

INDEX OF PASSAGES CITED

This *index locorum* covers (i) Ph. himself – excluding the parallel Text & Translation section – and (ii–iii) the ancient material I have drawn on to elucidate him. For the latter see also the General Index.

(i) PHILO
(main Commentary entry in **bold type**)

A1.1 [*79.1*]: 64, **135**
A1.1–2 [*79.1–2*]: 49
A1.1–7 [*79.1–7*]: 25, 49, 60
A1–38 [*79.1–82.42*]: 135, 181–182, 194
A1–87 [*79.1–86.21*]: 15, 16, 18, 37, 404
A1.2 [*79.2*]: 29, 50, 64, **135–136**
A1.2–3 [*79.2–3*]: **136**
A1.3 [*79.3*]: 63
A1.3–4 [*79.3–4*]: **136–137**
A1.4 [*79.4*]: 164
A1.4–5 [*79.4–5*]: **137**
A1.5–7 [*79.5–7*]: 28
A1.6 [*79.6*]: **137**
A1.6–7 [*79.6–7*]: **138–139**, 278
A2.1–2 [*79.7–8*]: **139**, 145, 155
A2.1–5 [*79.7–11*]: 26
A2–8 [*79.7–80.11*]: 60
A2.2 [*79.8*]: 364
A2.2–3 [*79.8–9*]: **139–140**
A2.3 [*79.9*]: 198
A3.1–2 [*79.11–12*]: **140–142**
A3.1–3 [*79.11–13*]: 145
A3.1–6 [*79.11–16*]: 194
A3–4 [*79.11–19*]: 187
A3.2 [*79.12*]: 26
A3.2–3 [*79.12–13*]: **142**, 147
A3.3 [*79.13*]: 167
A3.3–5 [*79.13–15*]: **142–143**
A3.4–5 [*79.14–15*]: 168, 320
A3.5–6 [*79.15–16*]: **143**
A4.1–3 [*79.16–18*]: **143–144**
A4.3 [*79.18*]: 142
A5.1 [*79.20*]: 26, 139, **144**
A5.1–2 [*79.20–21*]: 140
A5.2 [*79.21*]: 64
A6.1–2 [*79.21–22*]: **144–145**
A6.1–6 [*79.21–26*]: 140, 144, 146
A6.2–3 [*79.22–23*]: **145**
A6.2–5 [*79.22–25*]: 143
A6.3 [*79.23*]: 30
A6.5 [*79.25*]: **145**
A6.6 [*79.26*]: 30, 63, 142, **145–146**, 166, 273
A7.1–2 [*79.26–80.1*]: 50
A7.1–6 [*79.26–80.5*]: 30, 140, 146, 147, 182, 194
A7.2 [*80.1*]: **146**
A7.2–3 [*80.1–2*]: **146–147**
A7.3 [*80.2*]: 142
A7.4–5 [*80.3–4*]: 30 n. 57
A7.5–6 [*80.4–5*]: **147**
A8.1–2 [*80.5–6*]: **147**
A8.1–5 [*80.5–9*]: 26
A8.1–7 [*80.5–11*]: 143, 200
A8.2 [*80.6*]: 143, 381
A8.3 [*80.7*]: 256, 260
A8.3–5 [*80.7–9*]: 137, **147–148**
A8.4 [*80.8*]: 63
A8.4–5 [*80.8–9*]: 26, 63
A8.5–6 [*80.9–10*]: **148**
A8.5–7 [*80.9–11*]: 165
A8.6 [*80.10*]: **148–149**
A9.1 [*80.11*]: 148
A9.1–2 [*80.11–12*]: **149–150**
A9.1–6 [*80.11–16*]: 60, 174, 178
A9–10 [*80.11–19*]: 209
A9.3–4 [*80.13–14*]: 13, **150**
A9.4 [*80.14*]: 64, **150**, 306
A9.5–6 [*80.15–16*]: 143, **150–151**
A9.6 [*80.16*]: 341
A10.1 [*80.16*]: 26
A10.1–2 [*80.16–17*]: **151**
A10.1–4 [*80.16–19*]: 60, 178, 209, 290
A10.2 [*80.17*]: 13, 26 n. 44
A10.3–4 [*80.18–19*]: **151**
A10.4 [*80.19*]: **152**, 298
A11.1–2 [*80.19–20*]: **152**
A11.1–3 [*80.19–21*]: 188
A11.1–7 [*80.19–25*]: 152, 164
A11–12 [*80.19–27*]: 60
A11.2 [*80.20*]: 26, 63, 154
A11.3 [*80.21*]: 13, 174

A11.3–4 [*80.21–22*]: 137, **153**
A11.4–5 [*80.22–23*]: 381
A11.4–6 [*80.22–24*]: 172
A11.4–7 [*80.22–25*]: **153**
A11.5 [*80.23*]: 144
A11.5–6 [*80.23–24*]: 200
A11.6–7 [*80.24–25*]: 143
A12.1–2 [*80.25–26*]: **154**
A12.1–3 [*80.25–27*]: 188
A12.2 [*80.26*]: 13, 63
A12.2–3 [*80.26–27*]: **154**, 171
A13.1–3 [*80.28–30*]: 235
A13.1–4 [*80.28–31*]: 60, 143
A13.2–3 [*80.29–30*]: **154–155**
A13.3 [*80.30*]: 13
A13.4 [*80.31*]: 26 n. 44
A14.1 [*80.32*]: 26, 64, **155**, 363
A14.1–2 [*80.32–33*]: **155**
A14–16 [*80.32–45*]: 149
A14–19 [*80.32–81.5*]: 60, 155
A15.1 [*80.33*]: 64
A15.1–3 [*80.33–35*]: 151
A15–16 [*80.33–45*]: 155, 156
A15.2 [*80.34*]: 26, 139, 144, **155–156**
A15.3 [*80.35*]: **156**
A15.3–4 [*80.35–36*]: **156–158**
A15.5–8 [*80.37–40*]: **158**
A15.6–7 [*80.38–39*]: 294
A15.9 [*80.41*]: **158**
A16.1–2 [*80.41–42*]: **158**
A16.1–5 [*80.41–45*]: 158
A16.3 [*80.43*]: 35
A16.4–5 [*80.44–45*]: 142
A17.1 [*80.45*]: 155
A17.1–2 [*80.45–46*]: 25 n. 42, 35 n. 79, 50, **158–160**, 169
A17–18 [*80.45–51*]: 23, 163, 189
A17–19 [*80.45–81.5*]: 152, 188, 194
A17.2 [*80.46*]: **160–161**, 234
A17.2–3 [*80.46–47*]: 26, 151, 156, **161**
A17.3 [*80.47*]: 13
A17.3–4 [*80.47–48*]: **161–162**
A17.4 [*80.48*]: **162–163**
A17.4–5 [*80.48–49*]: 26, 183
A17.5 [*80.49*]: 13, 164
A18.1–3 [*80.49–51*]: **163**
A18.3 [*80.51*]: 13
A19.1 [*80.51*]: 334
A19.1–6 [*80.51–81.5*]: 143
A19.2 [*81.1*]: **163–164**
A19.2–3 [*81.1–2*]: 164
A19.2–4 [*81.1–3*]: 13
A19.4–5 [*81.3–4*]: 143
A19.5–6 [*81.4–5*]: 137, 161, **164**, 306
A20.1 [*81.6*]: 26
A20–21 [*81.6–25*]: 16
A20–28 [*81.6–46*]: 60
A20.2 [*81.7*]: **164**, 174
A20.2–3 [*81.7–8*]: 137, 153
A20.3 [*81.8*]: 152
A20.3–4 [*81.8–9*]: 152, **164**, 188
A20.4 [*81.9*]: 13
A20.4–8 [*81.9–13*]: 167, 282
A20.5 [*81.10*]: **164–165**
A20.5–6 [*81.10–11*]: **165**, 168
A20.7 [*81.12*]: 168
A20.8 [*81.13*]: **165**, 306
A20.8–9 [*81.13–14*]: 63, 143, 148, **16**
A20.8–10 [*81.13–15*]: 273
A20.9 [*81.14*]: 30, 31
A20.9–10 [*81.14–15*]: 31 n. 61, 142
A21.1–2 [*81.15–16*]: **166**
A21.1–11 [*81.15–25*]: 142, 273
A21.2 [*81.16*]: 31, 164
A21.2–3 [*81.16–17*]: 31 n. 61
A21.3 [*81.17*]: 145, **166**
A21.3–4 [*81.17–18*]: **166–167**
A21.4 [*81.18*]: 136
A21.4–5 [*81.18–19*]: 168, 320
A21.5–6 [*81.19–20*]: **167**
A21.7–9 [*81.21–23*]: **167**
A21.9 [*81.23*]: 167
A21.10 [*81.24*]: 164, 165
A21.10–11 [*81.24–25*]: 164, **167**
A22.1 [*81.25*]: **167–168**
A22.1–5 [*81.25–29*]: 165, 378
A22–24 [*81.25–33*]: 164–165, 168
A22.2 [*81.26*]: **168**
A22.2–3 [*81.26–27*]: 168
A22.3 [*81.27*]: 306
A22.3–4 [*81.27–28*]: **168–169**
A22.4–5 [*81.28–29*]: 328
A23.1 [*81.29*]: 256
A23.1–3 [*81.29–31*]: **169**
A23–24 [*81.29–33*]: 143
A23.2 [*81.30*]: 164, 168
A24.1–2 [*81.32–33*]: **169**
A25.1 [*81.34*]: 28
A25.1–3 [*81.34–36*]: **169–170**
A25.1–4 [*81.34–37*]: 142, 160, 273
A25.3 [*81.36*]: 26 n. 44
A25.3–4 [*81.36–37*]: 170
A26.1–2 [*81.37–38*]: **170–171**
A26.1–3 [*81.37–39*]: 143
A26–28 [*81.37–46*]: 164
A26.2–3 [*81.38–39*]: 171
A26.3–4 [*81.39–40*]: 154, **171**
A27.1 [*81.40*]: **171–172**

A27.1–2 [*81.40–41*]: 171
A27.1–4 [*81.40–43*]: 143
A27.2–4 [*81.41–43*]: 171
A28.1–2 [*81.43–44*]: 152, **172**
A28.2–4 [*81.44–46*]: **172**
A29.1–7 [*81.47–82.2*]: 60, 143, 148, 153, 175
A29.2–3 [*81.48–49*]: 143
A29.3 [*81.49*]: 26
A29.3–4 [*81.49–50*]: 13, **172**
A29.3–6 [*81.49–82.1*]: 200
A29.4–6 [*81.50–82.1*]: **172–173**
A29.6 [*82.1*]: 14
A30.1–4 [*82.2–5*]: 37, 61
A30.2 [*82.3*]: **173**
A30.2–3 [*82.3–4*]: 149, **173–174**
A30.3 [*82.4*]: 38, 63, **174**, 292
A30.3–4 [*82.4–5*]: 139
A31.1–2 [*82.5–6*]: 61, **174**
A31.2 [*82.6*]: 153
A32.1–2 [*82.6–7*]: **175**
A32.1–9 [*82.6–14*]: 61, 142–143, 166, 273
A32–33 [*82.6–21*]: 16
A32.3 [*82.8*]: 145, 166, **175**
A32.4 [*82.9*]: **175**
A32.4–5 [*82.9–10*]: **175–176**
A32.5 [*82.10*]: 38, 291–292
A32.6 [*82.11*]: 306
A32.7 [*82.12*]: 306
A32.8–9 [*82.13–14*]: **176**, 257, 378
A32.9 [*82.14*]: **176**
A33.1–2 [*82.14–15*]: **176–177**
A33.1–8 [*82.14–21*]: 192
A33–34 [*82.14–22*]: 150
A33–35 [*82.14–27*]: 61, 177, 178, 183, 192
A33.3 [*82.16*]: 26 n. 44
A33.5 [*82.18*]: **177**
A33.6 [*82.19*]: 144
A33.7–8 [*82.20–21*]: 334
A34.1–2 [*82.21–22*]: 145, **177**, 213
A35.1–2 [*82.22–23*]: **178**
A35.1–4 [*82.22–25*]: 143
A35.1–6 [*82.22–27*]: 193
A35.2–3 [*82.23–24*]: **178**, 275
A35.5–6 [*82.26–27*]: **178**
A36.1 [*82.28*]: **178–179**
A36.1–2 [*82.28–29*]: 37 n. 84, 346
A36.1–5 [*82.28–32*]: 201, 204
A36–38 [*82.28–42*]: 61, 178, 367, 369
A36.2 [*82.29*]: **179**, 282
A36.2–3 [*82.29–30*]: 139
A36.4 [*82.31*]: 63, **179**
A36.5 [*82.32*]: 165
A37.1–2 [*82.32–33*]: **179–180**, 369
A37–38 [*82.32–42*]: 179, 193, 202
A37.2 [*82.33*]: 29 n. 51, 304
A37.3 [*82.34*]: 32 n. 68, 144
A37.3–4 [*82.34–35*]: **180**
A37.5 [*82.36*]: 63, A12.2–3
A37.5–6 [*82.36–37*]: 180, **180**
A37.6–10 [*82.37–41*]: 180
A37.7 [*82.38*]: 350
A37.7–8 [*82.38–39*]: **180–181**, 261, 355
A38.1 [*82.41*]: 13
A38.1–2 [*82.41–42*]: **181**
A39.1 [*82.43*]: 28
A39.1–2 [*82.43–44*]: **181–182**
A39.1–3 [*82.43–45*]: 187
A39–40 [*82.43–50*]: 147
A39–43 [*82.43–83.7*]: 61, 181, 187, 213
A39.2 [*82.44*]: **182**, 198
A40.3 [*82.47*]: 147
A40.3–6 [*82.47–50*]: **182**
A40.4–5 [*82.48–49*]: 139
A41.1–2 [*82.50–51*]: **183**
A41.1–5 [*82.50–83.3*]: 187
A41–42 [*82.50–83.5*]: 143
A41.2–3 [*82.51–83.1*]: 188
A41.3–4 [*83.1–2*]: **183**
A42.1 [*83.3*]: 64, 164, **183**
A42.1–3 [*83.3–5*]: 192
A42.2 [*83.4*]: 150, **183**
A42.3 [*83.5*]: 341
A43.1–2 [*83.6–7*]: **183–184**
A44.1–2 [*83.7–8*]: **184–185**
A44.1–8 [*83.7–14*]: 61, 181, 187, 213
A44.2 [*83.8*]: 407
A44.2–3 [*83.8–9*]: 50, **185–186**
A44.3 [*83.9*]: 257
A44.3–4 [*83.9–10*]: 23 n. 35, 64, **186**
A44.4–5 [*83.10–11*]: 189
A44.4–6 [*83.10–12*]: 140, **186–187**
A44.5 [*83.10*]: 381
A44.7–8 [*83.13–14*]: 183
A44.8 [*83.14*]: 26
A45.1 [*83.15*]: 28
A45.1–2 [*83.15–16*]: **187**, 258
A45–54 [*83.15–47*]: 61, 181, 187, 198, 214
A45.2–4 [*83.16–18*]: **187–188**
A45.3–4 [*83.17–18*]: 13
A45.4 [*83.18*]: 13
A46.1–3 [*83.18–20*]: **188**
A46.1–4 [*83.18–21*]: 143
A46.4–47.2 [*83.21–24*]: **188–189**
A46.5–6 [*83.22–23*]: 13, 63, 189
A47.1 [*83.23*]: 63, 234
A47.1–2 [*83.23–24*]: 160, 169
A47.1–3 [*83.23–25*]: 189
A47.2 [*83.24*]: 183

A47.2–3 [*83.24–25*]: 161
A47.3 [*83.25*]: 150, **189**
A48.1–2 [*83.25–26*]: **189**
A48.1–3 [*83.25–27*]: 140, 187
A48.2 [*83.26*]: 63, **189–190**
A48.3 [*83.37*]: 381
A49.1–2 [*83.27–28*]: 188
A49.1–3 [*83.27–29*]: **190**
A49.1–4 [*83.27–30*]: 143
A49–50 [*83.27–34*]: 143
A49.3 [*83.29*]: 190
A49.3–4 [*83.29–30*]: 328
A50.1 [*83.30*]: 168, **190**, 192
A50.2 [*83.31*]: 168, 320
A50.2–3 [*83.31–32*]: **190–191**
A50.3–5 [*83.32–34*]: **191**
A50.4 [*83.33*]: 64
A50.5 [*83.34*]: 26 n. 44
A51.1–3 [*83.34–36*]: 138
A51.2 [*83.35*]: **191–192**
A51.3 [*83.36*]: 199, 368
A51.3–5 [*83.36–38*]: 191, **192**, 230
A51.4 [*83.37*]: 26 n. 44, 143
A51.4–5 [*83.37–38*]: 158
A52.1–2 [*83.38–39*]: **192**
A52.2 [*83.39*]: 183
A52.3 [*83.40*]: 199
A52.4 [*83.41*]: 136
A52.4–5 [*83.41–42*]: 183
A52.5 [*83.42*]: 190
A53.1–2 [*83.42–43*]: **192**
A53.2 [*83.43*]: 28
A54.1–2 [*83.44–45*]: 175, **193**
A54.3–4 [*83.46–47*]: 179, 369
A54.4 [*83.47*]: 164, **193**
A55.1–3 [*83.47–49*]: 152, **193–194**
A55–57 [*83.47–84.3*]: 143, 194
A55–58 [*83.47–84.5*]: 61, 181, 185, 193, 214
A55.2 [*83.48*]: 28
A56.1–3 [*83.50–84.1*]: 193
A57.1–2 [*84.1–2*]: 334
A57.2–3 [*84.2–3*]: 320
A58.1–3 [*84.3–5*]: 23, 29 n. 55, **194**
A59.1–2 [*84.5–6*]: **194**
A59.1–4 [*84.5–8*]: 23, 159
A59–60 [*84.5–12*]: 195
A59–61 [*84.5–18*]: 61, 215
A59–68 [*84.5–42*]: 181
A59.2 [*84.6*]: 28
A59.2–3 [*84.6–7*]: 147, **194**
A59.3–4 [*84.7–8*]: **194**
A59.4 [*84.8*]: 25 n. 42, 35 n. 79, 50
A60.1 [*84.8*]: 195
A60.1–3 [*84.8–10*]: **194–195**, 200
A60.1–5 [*84.8–12*]: 149
A60.2–3 [*84.9–10*]: 146
A60.3–5 [*84.10–12*]: 175, **195**
A60.5 [*84.12*]: 148, **195**
A61.1–3 [*84.13–15*]: **195–196**, 235
A61.1–6 [*84.13–18*]: 140, 143, 195
A61.3–6 [*84.15–18*]: 148
A61.4–6 [*84.16–18*]: 165
A62.1–2 [*84.18–19*]: **196–197**
A62–63 [*84.18–24*]: 61
A62.2 [*84.19*]: 189, **197**
A62.2–3 [*84.19–20*]: 363
A62.3 [*84.20*]: 146
A63.1 [*84.21*]: **197**
A63.2–3 [*84.22–23*]: **197**
A63.3–4 [*84.23–24*]: 189
A63.4 [*84.24*]: 63
A64.1–2 [*84.24–25*]: 139, **198**
A64–65 [*84.24–34*]: 198, 200
A64–66 [*84.24–36*]: 61
A64.2–3 [*84.25–26*]: 139
A64.3–5 [*84.26–28*]: 140
A64.2–4 [*84.25–27*]: **198**
A64.4–5 [*84.27–28*]: **199**
A64.5 [*84.28*]: 306
A65.1–2 [*84.28–29*]: 26
A65.1–3 [*84.28–30*]: **199**, 235
A65.1–7 [*84.28–34*]: 143
A65.4–5 [*84.31–32*]: 143, 148
A65.4–6 [*84.31–33*]: 165, **199**
A66.1 [*84.34*]: **199–200**
A66.1–3 [*84.34–36*]: 153, 199–200
A67.1 [*84.36*]: 63, 190
A67–68 [*84.36–42*]: 61, 178, 199
A67.2–3 [*84.37–38*]: **200**
A67.3–4 [*84.38–39*]: 200
A68.1–2 [*84.39–40*]: **200**
A68.1–4 [*84.39–42*]: 138, 175, 179
A68.3–4 [*84.41–42*]: 168, **200**
A69.1 [*84.43*]: 28
A69.1–2 [*84.43–44*]: **201**
A69.1–5 [*84.43–47*]: 180
A69–75 [*84.43–85.21*]: 199
A69–78 [*84.43–85.35*]: 61, 178, 279, 367, 369
A69.2–5 [*84.44–47*]: **201–202**
A69.3 [*84.45*]: 13
A69.4 [*84.46*]: 13
A70.1–4 [*84.47–50*]: **202**
A70–71 [*84.47–85.4*]: 143, 172
A70–73 [*84.47–85.13*]: 202
A70.2 [*84.48*]: 13
A70.4 [*84.50*]: 14, 369
A70.4–6 [*84.50–85.1*]: **202–203**
A71.1–2 [*85.1–2*]: 14, **203**

A71.1–3 [*85.1–3*]: 13
A71.3–4 [*85.3–4*]: **203**
A72.1–3 [*85.4–6*]: **203–204**
A72.3 [*85.6*]: 13
A73.1–8 [*85.6–13*]: 143, 172
A73.2–3 [*85.7–8*]: **204**
A73.3 [*85.8*]: 14
A73.3–4 [*85.8–9*]: 173, **204**
A73.3–5 [*85.8–10*]: 211
A73.5 [*85.10*]: **204**
A73.5–6 [*85.10–11*]: 190–191, **205**
A73.6 [*85.11*]: 143
A73.6–7 [*85.11–12*]: 204
A74.1–3 [*85.13–15*]: **205**
A74–75 [*85.13–21*]: 179
A74.4–5 [*85.16–17*]: 136
A74.4–7 [*85.16–19*]: 175
A75.1–3 [*85.19–21*]: 175, **205**
A75.3 [*85.21*]: 200, 209
A76.1–2 [*85.22–23*]: 47, **205**, 221
A76.1–3 [*85.22–24*]: 49
A76.1–8 [*85.22–29*]: 17, 20, 365, 413
A76.3 [*85.24*]: 32 n. 68
A76.3–4 [*85.24–25*]: 36, **205**
A76.4 [*85.25*]: 222
A76.5–7 [*85.26–28*]: 328
A76.7–8 [*85.28–29*]: **205–206**
A76.8 [*85.29*]: 401
A77.1–3 [*85.29–31*]: **206**
A77.1–4 [*85.29–32*]: 202, 369
A78.1–4 [*85.32–35*]: 207
A78.2 [*85.33*]: 258
A78.2–3 [*85.33–34*]: **206–207**
A78.3–4 [*85.34–35*]: 35
A79.1–2 [*85.35–36*]: **207**
A79.1–5 [*85.35–39*]: 17, 20, 154, 208, 416
A79–80 [*85.35–41*]: 61, 207, 303
A79.2 [*85.36*]: **207–208**, 367
A79.2–3 [*85.36–37*]: 168, **208**, 367
A79.3–5 [*85.37–39*]: **208–209**
A80.1 [*85.39*]: 345
A80.1–2 [*85.39–40*]: **209**
A80.2 [*85.40*]: 26 n. 44
A81.1–6 [*85.41–46*]: 143, 151, 178, 207
A81–83 [*85.41–86.2*]: 61, 179
A81.2 [*85.42*]: **209**
A81.3–4 [*85.43–44*]: 205
A81.3–5 [*85.43–45*]: **209**
A81.5–6 [*85.45–46*]: **209–210**
A81.6 [*85.46*]: 152, 158
A82.1 [*85.46*]: 172
A82.1–2 [*85.46–47*]: 210
A82.1–4 [*85.46–49*]: 190
A82–83 [*85.46–86.2*]: 175, 369
A82.3–4 [*85.48–49*]: **210**
A82.4 [*85.49*]: 26 n. 44
A83.1–2 [*85.49–50*]: **210**
A83.3–4 [*85.51–86.1*]: **211**
A83.4 [*86.1*]: 201, 204
A83.4–5 [*86.1–2*]: 328
A84.1 [*86.3*]: 26, 28
A84.1–3 [*86.3–5*]: **211**
A84.1–9 [*86.3–11*]: 37, 135
A84–85 [*86.3–13*]: 61, 173, 211
A84.3 [*86.5*]: **211–213**
A84.3–4 [*86.5–6*]: 198
A84.3–5 [*86.5–7*]: **213**
A84.4 [*86.6*]: 407
A84.5–7 [*86.7–9*]: **214**
A84.6–7 [*86.8–9*]: 35
A84.7–8 [*86.9–10*]: 193, **214–215**
A84.8–9 [*86.10–11*]: 159, **215**
A84.9 [*86.11*]: 139
A85.1–3 [*86.11–13*]: 211, **215**, 323
A85.2 [*86.12*]: 28, 181
A86.1–3 [*86.13–15*]: **216–217**
A86.1–6 [*86.13–18*]: 37 n. 86, 48+n. 121, 61, 210, 308
A86.4–6 [*86.16–18*]: **217**
A87.1–3 [*86.18–20*]: **217–218**
A87.1–4 [*86.18–21*]: 61, 273
A87.2 [*86.19*]: 28, 181
B1.1 [*86.21*]: 26
B1.1–2 [*86.21–22*]: **221**, 243
B1.1–3 [*86.21–23*]: 49
B1.1–7 [*86.21–27*]: 228–229
B1–2 [*86.21–32*]: 16
B1–5 [*86.21–39*]: 58, 61, 222, 243
B1.2 [*86.22*]: 64, 254
B1.2–3 [*86.22–23*]: **221–222**
B1.3 [*86.23*]: **222–223**
B1.3–4 [*86.23–24*]: **223**, 238
B1.3–7 [*86.23–27*]: 239
B1.4 [*86.24*]: **223–224**
B1.5 [*86.25*]: **224–225**
B1.5–6 [*86.25–26*]: **225–226**
B1.6–7 [*86.26–27*]: **226**
B1.7 [*86.27*]: 24 n. 36, 222, **226–227**
B2.1–2 [*86.27–28*]: **227**
B2.1–6 [*86.27–32*]: 47, 222, 229
B2.2–3 [*86.28–29*]: **227–228**
B2.4–6 [*86.30–32*]: **228**
B3.1 [*86.32*]: **228–229**
B3.1–4 [*86.32–35*]: 222, 239
B3.2 [*86.33*]: 239
B3.3–4 [*86.34–35*]: 222, 334
B4.1 [*86.35*]: 180
B4.1–2 [*86.35–36*]: 228, 233

B4.1–3 [*86.35–37*]: 58 n. 147, **229–230**
B4–5 [*86.35–39*]: 222
B4.3 [*86.37*]: 237, 334
B5.1–3 [*86.37–39*]: 227, **230**
B6.1 [*86.39*]: 223, 266
B6.1–2 [*86.39–40*]: **230**
B6.1–7 [*86.39–45*]: 222
B6–9 [*86.39–87.1*]: 61, 232, 238
B6–10 [*86.39–87.8*]: 425
B6–29 [*86.39–88.20*]: 50, 58, 220
B6.2 [*86.40*]: 390
B6.3 [*86.41*]: **230**
B6.4–5 [*86.42–43*]: 13
B6.4–7 [*86.42–45*]: **231**
B6.6–7 [*86.44–45*]: 229
B7.1–3 [*86.45–47*]: 231, **231**
B8.1–2 [*86.47–48*]: **231**
B9.1–5 [*86.47–87.1*]: 261
B9.2–3 [*86.49–50*]: **232**, 233
B9.3–5 [*86.50–87.1*]: 231
B9.4 [*86.51*]: A7.2, **232**
B9.4–5 [*86.51–87.1*]: 230
B9.5 [*87.1*]: 222, 334
B10.1–2 [*87.2–3*]: 233
B10.1–3 [*87.2–4*]: 229, **232–233**
B10.1–7 [*87.2–8*]: 44, 232
B10–24 [*87.2–51*]: 61, 232
B10.2 [*87.3*]: 29
B10.3 [*87.4*]: 164
B10.3–4 [*87.4–5*]: **233**
B10.4–5 [*87.5–6*]: 312
B10.4–6 [*87.5–7*]: 241
B10.6 [*87.7*]: 222
B10.6–7 [*87.7–8*]: **233**
B10.7 [*87.8*]: 232, 261
B11.1 [*87.9*]: **233**
B11.1–2 [*87.9–10*]: 262
B11–12 [*87.9–18*]: 236
B11–19 [*97.9–36*]: 160, 234
B11.3–5 [*87.11–13*]: **233–234**, 236
B12.1 [*87.13*]: 13
B12.1–2 [*87.13–14*]: **234**
B12.2 [*87.14*]: 29, 146
B12.3 [*87.15*]: 146
B12.3–6 [*87.15–18*]: **234**
B12.5 [*87.17*]: 13
B13.1–3 [*87.18–20*]: 146, 234, **234**
B14.1–2 [*87.20–21*]: **234–235**
B14.2 [*87.21*]: 29, 32 n. 68
B15.1–3 [*87.21–23*]: 235
B15.2 [*87.22*]: 29, 146
B15.3 [*87.23*]: 178, 233
B16.2 [*87.25*]: **235**, 235
B16.3 [*87.26*]: **235**
B16.3–4 [*87.26–27*]: 231, 235
B17.1 [*87.27*]: **235**
B17.2 [*87.28*]: 183, 233, 235
B17.2–3 [*87.28–29*]: 183
B17.3 [*87.29*]: 235, **235**
B17.3–4 [*87.29–30*]: 231
B18.1–2 [*87.30–31*]: **235**
B18.2–3 [*87.31–32*]: 235
B19.1 [*87.32*]: 218
B19.1–2 [*87.32–33*]: **236**
B19.1–5 [*87.32–36*]: 26
B19.2 [*87.33*]: 178
B19.5 [*87.36*]: 164, **236**
B20.1 [*87.37*]: 63, **236**
B20.1–2 [*87.37–38*]: 255
B20.1–4 [*87.37–40*]: 178
B20.3–4 [*87.39–40*]: 26, **236**, 237
B21.1–2 [*87.40–41*]: 234
B21.1–3 [*87.40–42*]: 173, **236–237**
B21.1–6 [*87.40–45*]: 236, 237
B21.3–6 [*87.42–45*]: **237**
B22.1–2 [*87.45–46*]: **237**
B22.1–3 [*87.45–47*]: 236, 237
B22.2 [*87.46*]: 146
B22.2–3 [*87.46–47*]: 136
B23.1–2 [*87.47–48*]: 28, 181, 236
B23.1–3 [*87.47–49*]: 150, 234, **237**
B23.2 [*87.48*]: 169
B24.1–3 [*87.49–51*]: 334
B24.2 [*87.50*]: 233
B25.1–4 [*87.51–88.3*]: 223, 230, **237–238**
B25–29 [*87.51–88.20*]: 61, 425
B26.1–2 [*88.3–4*]: 222
B26–27 [*88.3–14*]: 238
B26.2 [*88.4*]: 235
B26.2–3 [*88.4–5*]: **238**
B26.3–27.6 [*88.5–13*]: 230
B26.4–6 [*88.6–8*]: **238–239**
B26.5–6 [*88.7–8*]: 230
B27.1–2 [*88.8–9*]: 222
B27.1–7 [*88.8–14*]: 238
B27.2 [*88.9*]: 223, **239**, 266
B27.3 [*88.10*]: **239**
B27.5 [*88.12*]: 229
B27.5–6 [*88.12–13*]: **239–240**
B27.6 [*88.13*]: 231
B27.6–7 [*88.13–14*]: 239
B28.1–3 [*88.14–16*]: **240–241**
B28–29 [*88.14–21*]: 238
B28.2 [*88.15*]: 222, 233
B29.1 [*88.16*]: 178, **241**
B29.1–2 [*88.16–17*]: 371
B29.2 [*88.17*]: 183
B29.4 [*88.19*]: 26 n. 44

B30.1 [*88.20*]: 26
B30.1–2 [*88.20–21*]: 35, 49, **241–242**
B30.1–6 [*88.20–25*]: 58, 61, 222, 241
B30.2 [*88.21*]: 243
B30.2–5 [*88.21–24*]: **242–243**
B30.5–6 [*88.24–25*]: **243**
B31.1–2 [*88.25–26*]: **243**
B31.1–3 [*88.25–27*]: 221
B31.1–7 [*88.25–31*]: 20, 47, 58, 245, 412
B31–40 [*88.25–89.10*]: 226
B31–47 [*88.25–89.38*]: 58, 61
B31–48 [*88.25–89.46*]: 220n.
B31.2–3 [*88.26–27*]: 254
B31.3–4 [*88.27–28*]: **243–244**
B31.5 [*88.29*]: 158, **244–245**
B31.5–6 [*88.29–30*]: **245**
B31.6–7 [*88.30–31*]: 243
B32.1–2 [*88.31–32*]: **245**
B32–40 [*88.31–89.10*]: 15, 245
B32.2 [*88.32*]: 250
B32.2–4 [*88.32–33(sic)*]: **245**
B32.5–6 [*88.34–35*]: 225, **245**, 246
B32.6 [*88.35*]: 225
B32.8 [*88.37*]: **246**, 267
B32.8–9 [*88.37–38*]: **246**, 247, 249
B33.1–3 [*88.38–40*]: **246**, 328, 391
B34.1–3 [*88.41–43*]: **246**
B34.2–3 [*88.42–43*]: 245
B35.1 [*88.43*]: 225, **246–247**
B35.1–2 [*88.43–44*]: 246, **247**, 267
B35.1–5 [*88.43–47*]: 14
B35.2 [*88.44*]: **247**
B35.2–3 [*88.44–45*]: **247**
B35.4 [*88.46*]: 225, 247
B36.1–2 [*88.47–48*]: **247–248**
B36.1–4 [*87.47–50*]: 247
B36.3 [*88.49*]: 248
B37.1–2 [*88.50–51*]: 246–247, **248**
B37.3 [*89.1*]: 247, **248**
B38.2 [*89.3*]: 225, 247, 248, **248**
B38.3 [*89.4*]: 248
B39.2 [*89.6*]: 246, 249
B39.2–4 [*89.6–8*]: 246, **248**
B40.1–3 [*89.8–10*]: 20, **248**, 412
B41.1–2 [*89.10–11*]: 244, **248–249**
B41.3–4 [*89.12–13*]: 246, 248
B41.4–5 [*89.13–14*]: **249**
B42.1 [*89.15*]: 249
B42.1–2 [*89.15–16*]: 243, 245, 250
B42.3 [*89.17*]: 223, **249**
B42.3–4 [*89.17–18*]: **249**
B42.4 [*89.18*]: **249**
B42.4–7 [*89.18–21*]: 225, 261
B42.5–6 [*89.19–20*]: 14, 247, **250**
B42.6 [*89.20*]: 246
B42.6–7 [*89.20–21*]: **250**
B43.2–3 [*89.23–24*]: **250**
B44.1–2 [*89.24–25*]: **250–251**
B44.2–3 [*89.25–26*]: **251**
B45.1 [*89.27*]: **251**
B45.1–2 [*89.27–28*]: **251–252**
B45.2–3 [*89.28–29*]: **252**
B46.2–3 [89.32–33]: 250, **252–253**
B46.3 [*89.33*]: 246, 376
B46.3–4 [*89.33–34*]: 248
B46.3–5 [*89.33–35*]: **253**
B47.1 [*89.35*]: **253**
B47.2 [*89.36*]: 248
B47.2–3 [*89.36–37*]: 247, 252
B47.3–4 [*89.37–38*]: 250, **253**
B48.1 [*89.38*]: 26
B48.1–2 [*89.38–39*]: 221
B48.1–3 [*89.38–40*]: 52, **253–254**
B48.1–9 [*89.38–46*]: 58, 61, 243, 266
B48.2 [*89.39*]: 36+n. 83, 381
B48.3 [*89.40*]: 37 n. 86
B48.3–4 [*89.40–41*]: **254**, 255, 256
B48.4–6 [*89.41–43*]: 226, 251, **254–255**
B48.5 [*89.42*]: 24 n. 36
B48.6–7 [*89.43–44*]: **255**
B48.7 [*89.44*]: **255**
B49.1–2 [*89.46–47*]: 254, **255–256**
B49.1–8 [*89.46–90.2*]: 258
B49–50 [*89.46–90.5*]: 16
B49–53 [*89.46–90.24*]: 16, 61
B49.2 [*89.47*]: **256**
B49.2–3 [*89.47–48*]: 146, **256**
B49.4 [*89.49*]: **257**
B49.4–5 [*89.49–50*]: 31
B49.4–6 [*89.49–51*]: 143
B49.5 [*89.50*]: 185
B49.5–6 [*89.50–51*]: **257**
B49.6 [*89.51*]: 31, **257**
B49.7 [*90.1*]: **258**
B49.8 [*90.2*]: **258**
B50.1–2 [*90.2–3*]: **258–259**
B51.1 [*90.5*]: 257
B51.1–2 [*90.5–6*]: **259**, 265
B51.4 [*90.8*]: 306
B52.1–2 [*90.8–9*]: 265
B52.2 [*90.9*]: 256, **259–260**
B52.3 [*90.10*]: 179, 259, **260–261**
B52.4 [*90.11*]: 36, 205, 232, 247, 259, **261**
B52.5 [*90.12*]: 261, **262**
B52.5–6 [*90.12–13*]: **262**
B52.5–7 [*90.12–14*]: 36
B52.7 [*90.14*]: 24 n. 36, 226, **262–263**, 275
B53.1–2 [*90.14–15*]: 226, **263**

B53.1–7 [*90.14–20*]: 265, 395
B53.1–11 [*90.14–24*]: 23, 207, 265
B53.2–4 [*90.15–17*]: **263–264**
B53.3–4 [*90.16–17*]: 13, 181
B53.3–5 [*90.16–18*]: 35 n. 79
B53.4 [*90.17*]: **264**
B53.4–5 [*90.17–18*]: **264**
B53.5 [*90.18*]: 18 n. 7, **264–265**
B53.6 [*90.19*]: 247, **265**
B53.6–7 [*90.19–20*]: 266, 339
B53.6–11 [*90.19–24*]: 263, **265**
B53.7–9 [*90.20–22*]: 178, 265
B53.9 [*90.22*]: 30, 143, 231
B53.9–11 [*90.22–24*]: 306
B53.10 [*90.23*]: 306
B54.1–2 [*90.24–25*]: **266**
B54.1–4 [*90.24–27*]: 61, 232, 254, 261
B54.2 [*90.25*]: 223, **266–267**
B54.2–3 [*90.25–26*]: 14, **267**
B54.3 [*90.26*]: 14, 246, 248
B55.1 [*90.28*]: 256
B55.1–3 [*90.28–30*]: **267**
B55.1–7 [*90.28–34*]: 262
B55–57 [*90.28–45*]: 17, 50, 61
B55.2–3 [*90.29–30*]: 14
B55.3–4 [*90.30–31*]: **267–268**
B55.4 [*90.31*]: 26
B55.4–5 [*90.31–32*]: 270
B55.4–7 [*90.31–34*]: **268–269**
B55.5 [*90.32*]: 256, 274
B55.6 [*90.33*]: 243
B55.7 [*90.34*]: 270
B56.1–4 [*90.34–37*]: **269–270**
B56–57 [*90.34–45*]: 269
B56.2 [*90.35*]: 267
B56.3 [*90.36*]: 248
B56.4 [*90.37*]: 194
B56.4–5 [*90.37–38*]: 161, **270**
B56.5 [*90.38*]: **270**, 356
B56.7 [*90.40*]: 270
B57.3 [*90.42*]: 267
B57.5–6 [*90.44–45*]: **270–271**
C1.1–2 [*90.46–47*]: **273**
C1.1–4 [*90.46–49*]: 16, 61, 143
C1.2–4 [*90.47–49*]: **273–274**
C1.3 [*90.48*]: 30
C2.1–2 [*90.49–50*]: 47, 50, 274
C2.1–3 [*90.49–51*]: **274**, 377
C2.1–6 [*90.49–91.3*]: 61, 274
C2.3–4 [*90.51–91.1*]: **274–275**
C2.4 [*91.1*]: 306
C3.1–2 [*91.3–4*]: 277
C3.1–5 [*91.3–7*]: 326
C3.1–7 [*91.3–9*]: 277
C3–5 [*91.3–15*]: 16, 367
C3–6 [*91.3–19*]: 61, 143
C3–44 [*91.3–94.20*]: 16
C3.2 [*91.4*]: 26
C3.2–3 [*91.4–5*]: 24 n. 6, 226
C3.2–4 [*91.4–6*]: **275**
C3.3 [*91.5*]: 316
C3.4 [*91.6*]: 178, **275**
C3.4–5 [*91.6–7*]: 326
C3.4–6 [*91.6–8*]: **275–276**
C4.1–2 [*91.9–10*]: 261
C4.1–3 [*91.9–11*]: **276–277**, 277
C4.2 [*91.10*]: 36, 205
C5.1–3 [*91.11–13*]: 276, **277**
C5.2–3 [*91.12–13*]: 326
C5.3–5 [*91.13–15*]: 259, **277**, 361, 377
C5.4 [*91.14*]: 277
C5.4–5 [*91.14–15*]: 149
C6.1–2 [*91.15–16*]: **277–278**, 293
C6.1–5 [*91.15–19*]: 143
C6.2 [*91.16*]: 14
C6.2–5 [*91.16–19*]: **278**
C6.4–5 [*91.18–19*]: 31
C7.1 [*91.19*]: 138, **278**
C7.1–4 [*91.19–22*]: 175, **278–279**
C7.1–6 [*91.19–24*]: 17, 61, 138, 178, 360
C7.5 [*91.23*]: 26 n. 44
C8.1 [*91.25*]: 64, **279**
C8.1–4 [*91.25–28*]: 14, 190, **279–280**
C8–10 [*91.25–38*]: 367
C8–13 [*91.25–47*]: 61, 279
C8–17 [*91.25–92.22*]: 191
C8.2 [*91.26*]: 32, 64
C8.2–3 [*91.26–27*]: 281
C9.1–3 [*91.28–30*]: **280**
C9.1–6 [*91.28–33*]: 180, 261
C9.2–3 [*91.29–30*]: 281
C9.3 [*91.30*]: 392
C9.3–4 [*91.30–31*]: 190, **280–281**
C9.3–6 [*91.30–33*]: 280
C9.4 [*91.31*]: 279
C9.5 [*91.32*]: **281**
C10.1–3 [*91.33–35*]: **281**, 293
C10.1–6 [*91.33–38*]: 143
C10.2 [*91.34*]: 368
C10.3–4 [*91.35–36*]: 64, **281**
C10.4–5 [*91.36–37*]: 168
C10.4–6 [*91.36–38*]: 14, 164, 165, 172, **282**
C10.6 [*91.38*]: 183
C11.1–3 [*91.38–40*]: **282**
C11.2 [*91.39*]: 168
C12.1–2 [*91.40–41*]: 190
C12.1–3 [*91.40–42*]: 143, **282–283**
C12.1–4 [*91.40–43*]: 178

C12.2 [*91.41*]: 31
C12.2–3 [*91.41–42*]: 285
C12.3–4 [*91.42–43*]: 274, **283**
C13.1 [*91.43*]: 190
C13.1–2 [*91.43–44*]: 36
C13.1–3 [*91.43–45*]: **283**, 345, 370
C13.3 [*91.45*]: 32, **283–284**, 285, 368
C13.3–4 [*91.45–46*]: 143
C13.5 [*91.47*]: 183
C14.1 [*91.47*]: 279
C14.1–3 [*91.47–49*]: **284**, 286
C14–17 [*91.47–92.22*]: 61, 191
C14.2 [*91.48*]: 284
C14.3–4 [*91.49–50*]: **284**
C14.4–5 [*91.50–51*]: 149, 390
C14.4–7 [*91.50–92.2*]: **284–285**
C14.6–7 [*92.1–2*]: 155, 363
C14.8–9 [*92.3–4*]: 284, 286
C14.8–10 [*92.3–5*]: 178, **285**
C14.9 [*92.4*]: 26 n. 44
C14.10 [*92.5*]: 368
C14.10–11 [*92.5–6*]: 149
C14.10–13 [*92.5–8*]: **285**
C14.11 [*92.6*]: 64, 191
C14.11–12 [*92.6–7*]: 368
C14.11–13 [*92.6–8*]: 192
C14.12–13 [*92.7–8*]: 286
C14.13 [*92.8*]: 199
C15.1–4 [*92.8–11*]: **286**
C15–17 [*92.8–22*]: 191, 285, 368
C15.2 [*92.9*]: 334
C15.2–3 [*92.9–10*]: 139
C15.3 [*92.10*]: 287
C15.4–8 [*92.11–15*]: **286–287**
C15.5–6 [*92.12–13*]: 314
C15.6 [*92.13*]: 32
C15.6–7 [*92.13–14*]: 287, 368
C15.7 [*92.14*]: 368
C16.1 [*92.15*]: 139
C16.1–5 [*92.15–19*]: 183, **287**
C16–17 [*92.15–22*]: 287
C16.3 [*92.17*]: 199
C16.4 [*92.18*]: 286
C17.1–4 [*92.19–22*]: 287, **287–288**
C17.3 [*92.21*]: 144
C17.3–4 [*92.21–22*]: 143
C18.1–2 [*92.22–23*]: 29
C18.1–3 [*92.22–24*]: **288**
C18.1–6 [*92.22–27*]: 17, 294
C18–27 [*92.22–93.4*]: 61
C18.2 [*92.23*]: 150
C18.3–6 [*92.24–27*]: 288
C18.4–5 [*92.25–26*]: 306
C18.5 [*92.26*]: 30, 143
C18.5–6 [*92.26–27*]: 47, 50, 274, **288–289**
C19.1–3 [*92.27–29*]: **289**, 293, 367
C20.1–2 [*92.29–30*]: 338
C20.2–3 [*92.30–31*]: 306
C20.2–5 [*92.30–33*]: **289–290**
C20.3 [*92.31*]: 183
C20.4–5 [*92.32–33*]: 150
C20.5 [*92.33*]: 63
C21.1–2 [*92.33–34*]: 30 n. 57
C21.3–4 [*92.35–36*]: **290**
C22.1–5 [*92.36–40*]: 158
C22.2–3 [*92.37–38*]: 365
C22.3–4 [*92.38–39*]: 143
C22.4–5 [*92.39–40*]: **290**
C22.5 [*92.40*]: 195
C23.1–3 [*92.40–42*]: 149, **290**
C23.1–7 [*92.40–46*]: 291
C23–24 [*92.40–48*]: 290
C23–25 [*92.40–93.1*]: 254
C23–30 [*92.40–93.23*]: 39–40+n. 97
C23.2 [*92.41*]: 188
C23.2–3 [*92.41–42*]: 284
C23.3–4 [*92.42–43*]: **290–291**
C23.4 [*92.43*]: 29
C23.4–5 [*92.43–44*]: **291**
C23.5 [*92.44*]: 292
C23.5–6 [*92.44–45*]: 292
C23.6 [*92.45*]: 26
C23.7 [*92.46*]: 290
C24.1–3 [*92.46–48*]: **291–292**
C24.2 [*92.47*]: 38
C25.1 [*92.49*]: **292**
C25.1–4 [*92.49–93.1*]: **292–293**
C25.2 [*92.50*]: 378
C25–26 [*92.49–93.3*]: 296
C26.1–2 [*93.1–2*]: 278
C26.1–3 [*93.1–3*]: 49, 143, 221, 290, **293**, 320
C26.2 [*93.2*]: 14, 31
C26.2–3 [*93.2–3*]: 13, 31 n. 61
C27.1–2 [*93.3–4*]: 47, 49, 51, 221, 227, 256, **293–294**, 306
C28.1 [*93.5*]: **294**
C28.1–4 [*93.5–8*]: 17
C28–29 [*93.5–11*]: 61, 294
C28.2–4 [*93.6–8*]: **294–295**
C28.3–4 [*93.7–8*]: 294
C29.1–2 [*93.8–9*]: 293, 296
C29.1–4 [*93.8–11*]: 17, 49, **295**
C29.2 [*93.9*]: 270
C29.3–4 [*93.10–11*]: 300
C30.1–2 [*93.11–12*]: 35, 144, **295–296**
C30.1–13 [*93.11–23*]: 53, 290, 336
C30–33 [*93.11–32*]: 62
C30.2–7 [*93.12–17*]: 292

C30.5 [*93.15*]: 31, 31 n. 61
C30.5–7 [*93.15–17*]: **296**
C30.6 [*93.16*]: 378
C30.6–7 [*93.16–17*]: 356
C30.7–8 [*93.17–18*]: 47, 50, 274
C30.7–11 [*93.17–21*]: **296**, 307
C30.8–9 [*93.18–19*]: 294
C30.12–13 [*93.22–23*]: 290, 296, **296**
C31.1–3 [*93.23–25*]: 42, 45, **297**
C32.1–2 [*93.25–26*]: 26
C32.1–3 [*93.25–27*]: **298**
C32.1–5 [*93.25–29*]: 17, 152, 178, 365
C32–36 [*93.25–44*]: 16
C32.3–4 [*93.27–28*]: 290
C32.4–5 [*93.28–29*]: **298**
C33.1–4 [*93.29–32*]: 175, 179, **298**, 306
C33.3 [*93.31*]: 257, 259
C33.3–4 [*93.31–32*]: 367
C34.1–2 [*93.32–33*]: 274
C34.1–4 [*93.32–35*]: **299**
C34.1–5 [*93.32–36*]: 17, 47, 50, 54, 300
C34–35 [*93.32–41*]: 53
C34–38 [*93.32–52*]: 62, 303
C34.2 [*93.33*]: 26
C34.2–3 [*95.33–34*]: 294
C35.1–2 [*93.36–37*]: 186, 299
C35.1–5 [*93.36–40*]: **299–300**
C35.1–6 [*93.36–41*]: 336
C35–38 [*93.36–52*]: 17, 295
C35.2 [*93.37*]: 270
C35.3 [*93.38*]: 53, 270
C35.5–6 [*93.40–41*]: 299
C36.1 [*93.41*]: 270
C36.1–4 [*93.41–44*]: **300**
C36–37 [*93.41–48*]: 295
C36.2–3 [*93.42–43*]: 270
C36.3–4 [*93.43–44*]: 365
C37.1 [*93.44*]: 270
C37.1–5 [*93.44–48*]: **301–302**
C37.2 [*93.45*]: 270
C38.1–2 [*93.48–49*]: **302–303**
C38.1–5 [*93.48–52*]: 300
C38.2 [*93.49*]: 270
C38.3 [*93.50*]: 195
C38.4–5 [*93.51–52*]: **303**
C39.1 [*94.1*]: 168
C39.1–2 [*94.1–2*]: 154
C39.1–4 [*94.1–4*]: **303**
C39.1–6 [*94.1–6*]: 207, 304
C39–41 [*94.1–10*]: 17, 178, 303–304
C39–44 [*94.1–20*]: 62
C39.2–3 [*94.2–3*]: 143
C39.3 [*94.3*]: 26 n. 44
C39.4 [*94.4*]: 264
C39.4–6 [*94.4–6*]: 265, **303–304**
C39.5 [*94.5*]: 263
C40.1–3 [*94.6–8*]: **304**, 305
C40.2 [*94.7*]: 29 n. 51
C41.1–2 [*94.8–9*]: 283
C41.1–3 [*94.8–10*]: 143, 207, **304**
C41.2–3 [*94.9–10*]: 261
C42.1–2 [*94.10–11*]: 385
C42.1–3 [*94.10–12*]: **304–305**, 336
C43.1–2 [*94.12–13*]: **305**, 306
C44.1–3 [*94.13–15*]: **305**
C44.1–8 [*94.13–20*]: 50 n. 124, 175, 178, 304, 305
C44.2–3 [*94.14–15*]: 305
C44.3–6 [*94.15–18*]: **305–306**
C44.6–8 [*94.18–20*]: 295, **306**
C45.1–3 [*94.20–22*]: **306**
C45.1–5 [*94.20–24*]: 254, 331
C45–48 [*94.20–31*]: 47, 51, 62, 306, 309, 331
C45.3–5 [*94.22–24*]: 296, **307**
C46.1–3 [*94.24–26*]: 216, **307–308**, 344
C46–48 [*94.24–31*]: 210
C46.2 [*94.25*]: 63
C47.1–2 [*94.26–27*]: 221, **308**
C47.1–4 [*94.26–29*]: 42, 49, 217
C47.2–4 [*94.27–29*]: 307, **308–309**
C48.1–3 [*94.29–31*]: 295, **309**, 322
C49.1–3 [*94.32–34*]: **309–310**, 364
C49–50 [*94.32–35*]: 62, 365
C49–59 [*94.32–95.25*]: 16
C49.2 [*94.33*]: 364
C50.1–2 [*94.34–35*]: 306, **310**, 334
C51.1–2 [*94.36–37*]: 144, **310–311**, 338
C51.1–5 [*94.36–40*]: 179, 207, 310, 366
C51–62 [*94.36–95.32*]: 62, 354
C51–71 [*94.36–96.14*]: 16
C51.2 [*94.37*]: 403
C51.2–3 [*94.37–38*]: **311**
C51.3–4 [*94.38–39*]: **311–312**
C51.4 [*94.39*]: 256
C51.5 [*94.40*]: **312**
C52.1–3 [*94.40–42*]: **312–313**
C52.1–4 [*94.40–43*]: 317, 371
C52–57 [*94.40–95.17*]: 36
C52–58 [*94.40–95.20*]: 398
C52–62 [*94.40–95.32*]: 310
C52.3 [*94.42*]: 241, 286
C52.3–4 [*94.42–43*]: **313–314**
C52.4 [*94.43*]: 214, 256
C53.1–2 [*94.43–44*]: 287
C53.1–3 [*94.43–45*]: **314**
C53.1–7 [*94.43–49*]: 317
C53.3 [*94.45*]: 63
C53.3–6 [*94.45–48*]: **314–315**

C53.4–5 [*94.46–47*]: 169, 256
C53.5 [*94.47*]: 63
C53.5–6 [*94.47–48*]: 275, 316
C53.6–7 [*94.48–49*]: **315**
C53.7 [*94.49*]: 13
C54.1 [*94.49*]: 320
C54.1–2 [*94.49–50*]: 63
C54.1–4 [*94.49–95.1*]: **315–316**
C54.1–8 [*94.49–95.5*]: 317, 398
C54.2 [*94.50*]: 256
C54.3 [*94.51*]: 63
C54.3–6 [*94.51–95.3*]: 183
C54.4–8 [*95.1–5*]: **316**
C54.7 [*95.4*]: 275
C54.7–8 [*95.4–5*]: 318, 321
C55.1–2 [*95.5–6*]: 313
C55.1–3 [*95.5–7*]: **316–317**
C55.1–5 [*95.5–9*]: 207, 318
C55–58 [*95.5–20*]: 178, 304
C55.3 [*95.7*]: 259, 320
C55.3–4 [*95.7–8*]: 260, **317**
C55.4 [*95.8*]: 261, 304
C55.4–5 [*95.8–9*]: **317**
C56.1 [*95.9*]: 312
C56.1–3 [*95.9–11*]: **317–318**
C56–57 [*95.9–17*]: 320
C56–58 [*95.9–20*]: 143
C56.2–3 [*95.10–11*]: 14
C56.3–4 [*95.11–12*]: 290, 312
C56.3–7 [*95.11–15*]: **318–319**
C56.4–5 [*95.12–13*]: 316, 321
C56.6 [*95.14*]: 260, 361
C57.1–2 [*95.15–16*]: **319**
C57.2–3 [*95.16–17*]: **319**
C57.3 [*95.17*]: 13, 14
C58.1–2 [*95.17–18*]: 168
C58.1–4 [*95.17–20*]: **320**
C58.3–4 [*95.19–20*]: 31, 283
C59.1–3 [*95.20–22*]: **320–321**
C59.1–5 [*95.20–24*]: 357
C59.2 [*95.21*]: 372
C59.3 [*95.22*]: 311, 358
C59.3–5 [*95.22–24*]: 316
C59.3–6 [*95.22–25*]: **321–322**
C59.5–6 [*95.24–25*]: 284
C60.1–2 [*95.25–26*]: 337
C60.1–4 [*95.25–28*]: 336, 371
C60–61 [*95.25–29*]: 322
C60.2 [*95.26*]: 339
C60.2–4 [*95.26–28*]: 286, **322**
C60.3–4 [*95.27–28*]: 371
C61.1–2 [*95.28–29*]: **322**, 334
C62.1–4 [*95.29–32*]: 310, **322**
C62.3–4 [*95.31–32*]: 311
C63.1–3 [*95.32–34*]: **322–323**
C63.1–5 [*95.32–36*]: 62, 215
C63–71 [*95.32–96.14*]: 16, 310
C63.3 [*95.34*]: 259, 277
C63.3–4 [*95.34–35*]: 306
C64.1 [*95.36*]: 32, 320
C64.1–2 [*95.36–37*]: **323**, 351
C64.1–4 [*95.36–39*]: 62, 143
C64.2 [*95.37*]: 63
C64.2–3 [*95.37–38*]: **323–324**
C64.3–4 [*95.38–39*]: **324**
C65.1–5 [*95.39–43*]: **324–325**, 326
C65.1–6 [*95.39–44*]: 17, 20, 154, 262, 364, 416
C65–66 [*95.39–49*]: 62
C65.3 [*95.41*]: 331
C65.4 [*95.42*]: 284
C65.4–5 [*95.42–43*]: 365
C65.5–6 [*95.43–44*]: **325**
C65.6 [*95.44*]: 26 n. 44
C66.1–2 [*95.44–45*]: **325–326**
C66.1–6 [*95.44–49*]: 180, 261
C66.2–3 [*95.45–46*]: 291
C66.2–6 [*95.45–49*]: **326**
C66.4 [*95.47*]: 276, 315
C67.1–2 [*95.49–50*]: 172
C67.1–4 [*95.49–96.1*]: **327**
C67–68 [*95.49–96.8*]: 28, 31, 319
C67–71 [*95.49–96.14*]: 62, 143, 327
C67.2–3 [*95.50–51*]: 14, 319
C67.3 [*95.51*]: 31
C67.4 [*96.1*]: 145, 166
C67.4–5 [*96.1–2*]: **327**
C68.1–4 [*96.2–5*]: 327
C68.2 [*96.3*]: 145, 166
C68.3 [*96.4*]: 381
C68.4–5 [*96.5–6*]: 257, **327**
C68.5 [*96.6*]: 353
C68.5–6 [*96.6–7*]: 32
C68.5–7 [*96.6–8*]: 190, 191, **327**
C69.2 [*96.9*]: **327**
C70.1–3 [*96.10–12*]: 143, 288, **328**
C70.2–3 [*96.11–12*]: 30
C71.1–3 [*96.12–14*]: **328**
C72.1 [*96.15*]: 165, **328–329**
C72.1–10 [*96.15–24*]: 221
C72–73 [*96.15–26*]: 35, 49, 62
C72.2 [*96.16*]: 30, **329–330**
C72.2–4 [*96.16–18*]: 156n.
C72.3 [*96.17*]: 31, 226
C72.3–4 [*96.17–18*]: **330**
C72.4 [*96.18*]: 246, 380
C72.4–5 [*96.18–19*]: **330–331**
C72.5 [*96.19*]: 246
C72.5–7 [*96.19–21*]: 274

C72.5–10 [*96.19–24*]: **331**
C72.6–7 [*96.20–21*]: 306
C72.7–10 [*96.21–24*]: 306
C72.8–9 [*96.22–23*]: 316
C72.10 [*96.24*]: 380
C73.1–3 [*96.24–26*]: **331–332**
D1.1–2 [*96.27–28*]: 62, 273, **334**
D1–11 [*96.27–97.34*]: 16
D2.1 [*96.28*]: 51, 64, 334, **335**
D2.1–4 [*96.28–31*]: 52+n. 129
D2–3 [*96.28–33*]: 17, 54
D2–4 [*96.28–37*]: 20, 37 n. 86, 54+n. 134, 56, 62, 254, 333, 382, 414
D2.2 [*96.29*]: 63, **335**
D2.2–3 [*96.29–30*]: **335**
D2.3 [*96.30*]: 144
D2.3–4 [*96.30–31*]: **336**
D2.4 [*96.31*]: 305
D3.1–3 [*96.31–33*]: 35, **336**
D3.3 [*96.33*]: 26 n. 44
D4.1–3 [*96.33–35*]: **336–337**
D4.1–5 [*96.33–37*]: 54, 154, 383
D4.3–5 [*96.35–37*]: **337–338**, 381
D5.1–2 [*96.37–38*]: **338**
D5.1–5 [*96.37–41*]: 16, 354
D5–6 [*96.37–49*]: 179
D5–8 [*96.37–97.9*]: 56–57+n. 143
D5–11 [*96.37–97.34*]: 62
D5–71 [*96.37–102.8*]: 334
D5.2 [*96.38*]: 36, 283
D5.3–5 [*96.39–41*]: **338–339**
D5.4–5 [*96.40–41*]: 312, 322, 398
D6.1 [*96.42*]: 35
D6.1–3 [*96.42–44*]: **339**
D6.1–8 [*96.42–49*]: 20, 194, 412
D6.2–4 [*96.43–45*]: 344, 394
D6.3–4 [*96.44–45*]: 338, **339**
D6.5 [*96.46*]: 26
D6.5–7 [*96.46–48*]: **339–340**, 355, 379
D6.5–7.4 [*96.46–97.1*]: 393
D6.7–8 [*96.48–49*]: **340**
D7.1–3 [*96.49–51*]: 274
D7.1–4 [*96.49–97.1*]: 47, **340–341**
D7.2–4 [*96.50–97.1*]: 339, 379
D8.2 [*97.2*]: 165
D8.3–4 [*97.3–4*]: **341**
D8.4–5 [*97.4–5*]: 165
D8.4–7 [*97.4–7*]: **341–342**
D8.5–7 [*97.5–7*]: 334
D8.6 [*97.6*]: 31, 156n.
D8.7 [*97.7*]: 37
D8.7–9 [*97.7–9*]: **342**
D9.1–11 [*97.9–19*]: 20, 412
D9–11 [*97.9–34*]: 57
D9.2 [*97.10*]: 30, 143, **342**, 352
D9.3 [*97.11*]: 365
D9.3–5 [*97.11–13*]: 340, **342–344**, 355, 379
D9.3–7 [*97.11–15*]: 154
D9.5–7 [*97.13–15*]: **344**
D9.6 [*97.14*]: 168
D9.7–8 [*97.15–16*]: **344**
D9.8 [*97.16*]: 165
D9.9–10 [*97.17–18*]: 349
D9.9–11 [*97.17–19*]: **344**
D10.1–2 [*97.19–20*]: 344
D10.1–3 [*97.19–21*]: 149
D10.1–4 [*97.19–22*]: 179
D10.1–12 [*97.19–30*]: 20, 194, 413
D10.2 [*97.20*]: 218
D10.2–4 [*97.20–22*]: **344–345**, 394
D10.3–4 [*97.21–22*]: 230
D10.4–6 [*97.22–24*]: **345–346**, 373
D10.4–7 [*97.22–25*]: 283
D10.6 [*97.24*]: 24 n. 36, 226, 275
D10.6–7 [*97.24–25*]: **346**, 351
D10.7–8 [*97.25–26*]: 190
D10.7–9 [*97.25–27*]: **346**
D10.7–11 [*97.25–29*]: 18
D10.7–11.5 [*97.25–34*]: 204, 362
D10.8–9 [*97.26–27*]: 138
D10.9 [*97.27*]: 37 n. 84, 178
D10.9–12 [*97.27–30*]: **346**
D10.9–11.5 [*97.27–34*]: 367
D10.11 [*97.29*]: 339
D10.12 [*97.30*]: 218
D11.1–5 [*97.30–34*]: 20, 346, **347**, 415
D11.3–5 [*97.32–34*]: 398
D11.4–5 [*97.33–34*]: 274
D12.1 [*97.34*]: 26
D12.1–2 [*97.34–35*]: **347**
D12–16 [*97.34–98.4*]: 55+n. 140, 57, 62, 340
D12.2–3 [*97.35–36*]: 138, 256
D12.2–4 [*97.35–37*]: **347–348**
D12.3 [*97.36*]: 32, 350
D12.4–6 [*97.37–39*]: 143, 257, **348**
D12.4–8 [*97.37–41*]: 347
D12.5 [*97.38*]: 185
D12.5–6 [*97.38–39*]: 30
D12.6–8 [*97.39–41*]: **348**
D13.1–2 [*97.41–42*]: 45, 297
D13.1–5 [*97.41–45*]: 347, **348–349**
D13–14 [*97.41–49*]: 51
D13.2–3 [*97.42–43*]: 274, 307
D13.3–4 [*97.43–44*]: 45, 305
D14.1–3 [*97.45–47*]: 144
D14.1–5 [*97.45–49*]: 45, **349**
D14.3–4 [*97.47–48*]: 45
D14.4–5 [*97.48–49*]: 342

D15.1–4 [*97.49–98.1*]: 55
D15–16 [*97.49–98.4*]: 374
D15.2–4 [*97.50–98.1*]: **349–350**
D15.3–4 [*97.51–98.1*]: 36
D16.1–4 [*98.1–4*]: **350–351**
D17–19 [*98.4–20*]: 16
D17–20 [*98.4–24*]: 62
D17–58 [*98.4–101.2*]: 57
D17.2 [*98.5*]: 144
D17.2–3 [*98.5–6*]: 311
D17.2–4 [*98.5–7*]: 323, **351**
D17.3–4 [*98.6–7*]: 306
D17.3–7 [*98.6–10*]: 352
D17.4–5 [*98.7–8*]: 312
D17.4–6 [*98.7–9*]: **351**
D17.5 [*98.8*]: 24 n. 36, 226, 256, 275
D17.6 [*98.9*]: 276, 326
D17.6–7 [*98.9–10*]: **351–352**
D17.7–8 [*98.10–11*]: **352**, 352
D17.7–10 [*98.10–13*]: 143
D17.8–10 [*98.11–13*]: 143, 278, **352**
D17.9 [*98.12*]: 14
D17.9–10 [*98.12–13*]: 13, 31 n. 61
D18.1–2 [*98.13–14*]: 311
D18.1–4 [*98.13–16*]: **353**
D18.1–5 [*98.13–17*]: 20, 412
D19.1–3 [*98.17–19*]: 274
D19.1–4 [*98.17–20*]: 190
D19.2–3 [*98.18–19*]: **353**, 362
D19.3 [*98.19*]: 199
D19.3–4 [*98.19–20*]: **353**
D20.1–5 [*98.20–24*]: 51, **353**
D21.1–2 [*98.24–25*]: 311
D21.1–3 [*98.24–26*]: 316, 317, 320, **354**, 362
D21–23 [*98.24–34*]: 36, 62
D21–33 [*98.24–99.20*]: 16
D22.1–2 [*98.27–28*]: 312, 313, 355
D22.1–5 [*98.27–31*]: 339, **354**
D22.2 [*98.28*]: 363, 400
D22.3–5 [*98.29–31*]: 399
D23.1–2 [*98.31–32*]: 312, 313
D23.1–4 [*98.31–34*]: 317, **354–355**
D23.3 [*98.33*]: 180
D23.4 [*98.34*]: 320
D24–27 [*98.34–99.3*]: 16
D24–29 [*98.34–99.10*]: 62
D24.2–3 [*98.35–36*]: 274
D24.2–4 [*98.35–37*]: **355**, 379
D24.4 [*98.37*]: 26, 144
D24.4–6 [*98.37–39*]: **355–356**
D25.1 [*98.42*]: 30, 218, 328
D25.1–4 [*98.42–45*]: 143, **356**, 363
D25.2 [*98.43*]: 143, 286, 368
D25.3 [*98.44*]: 284
D26.1 [*98.45*]: 26
D26.1–3 [*98.45–47*]: 270, 274, **356**
D26–27 [*98.45–99.3*]: 20, 412
D26.3 [*98.47*]: 356
D26.3–4 [*98.47–48*]: 235
D27.1–3 [*98.48–50*]: **357**
D27.3–4 [*98.50–51*]: **357**
D27.3–7 [*98.50–99.3*]: 357
D28.1 [*99.3*]: 158, **357**
D28.1–4 [*99.3–6*]: 51, 353
D29.1 [*99.6*]: 63
D29.1–4 [*99.6–9*]: **357–358**
D29.1–5 [*99.6–10*]: 339
D29–51 [*99.6–100.32*]: 16
D29.3 [*99.8*]: 321
D29.3–4 [*99.8–9*]: 311
D29.4 [*99.9*]: 63
D30.1–2 [*99.11–12*]: 63
D30.1–3 [*99.11–13*]: 20, 138, 278, **358**, 413
D30–32 [*99.11–19*]: 369
D30–33 [*99.11–20*]: 62
D31.1–3 [*99.13–15*]: 152, **358–359**
D31–33 [*99.13–20*]: 143
D31.3 [*99.15*]: 291
D31.3–32.2 [*99.15–19*]: 360
D31.4 [*99.16*]: 291
D31.4–5 [*99.16–17*]: 13, 31, 31 n. 61, 293, 320, **359**
D31.5–6 [*99.17–18*]: 14, 31, 319
D32.1–2 [*99.18–19*]: 17, 20, 278, **359–360**, 413
D33.1–2 [*99.19–20*]: 194, **360**
D34–35 [*99.21–28*]: 17, 178, 369
D34–40 [*99.21–47*]: 62
D34.2 [*99.22*]: 284
D34.3 [*99.23*]: 256, 260, 351
D34.3–4 [*99.23–24*]: **360–361**
D34.4 [*99.24*]: 205, 364
D34.4–5 [*99.24–25*]: 276
D34.4–6 [*99.24–26*]: **361**
D34.5 [*99.25*]: 36
D34.5–6 [*99.25–26*]: 232
D34.6 [*99.26*]: 261, 377
D35.1–3 [*99.26–28*]: 20, 231, 264, **361**, 415
D36.1–2 [*99.29–30*]: 282
D36.1–4 [*99.29–32*]: 190, **362**
D36–37 [*99.29–37*]: 20, 218, 353, 362, 365, 412
D37.1–2 [*99.32–33*]: 259, 377
D37.2 [*99.33*]: 168
D37.2–3 [*99.33–34*]: **362**
D37.3–4 [*99.34–35*]: **362**
D37.4–5 [*99.35–36*]: 274
D37.4–6 [*99.35–37*]: 362
D38.1–2 [*97.37–38*]: 139
D38.1–4 [*99.37–40*]: 16, 316, 354, **362**

D38.2–3 [*99.38–39*]: 362
D39.1–2 [*99.41–42*]: **362–363**
D39.1–4 [*99.41–44*]: 20, 204, 218, 346, 362, 413
D39.2 [*99.42*]: 63
D39.4 [*99.44*]: 306
D40.1–2 [*99.44–45*]: 363
D40.1–4 [*99.44–47*]: **363**
D40.2 [*99.45*]: 345
D40.3 [*99.46*]: 362
D40.3–4 [*99.46–47*]: 139
D41.1 [*99.48*]: 325, **363–364**
D41.1–4 [*99.48–51*]: 17, 178, 324, 373
D41–56 [*99.48–100.46*]: 62, 360
D41.2–4 [*99.49–51*]: **364–365**
D41.3 [*99.50*]: 263
D41.3–4 [*99.50–51*]: 139, 301
D41.4 [*99.51*]: 301
D42.1–3 [*99.51–100.2*]: 360, **365**, 368
D42.3 [*100.2*]: 371
D43.1–3 [*100.2–4*]: 353, **365**
D43–44 [*100.2–11*]: 20, 413
D43.2–3 [*100.3–4*]: 190
D43.3–5 [*100.4–6*]: 202, 206, **365–366**
D43.4–5 [*100.5–6*]: 230
D44.1–6 [*100.6–11*]: 207, 218, 311, **366**
D44.4 [*100.9*]: 258
D45.1–2 [*100.11–12*]: **366–367**
D45.2 [*100.12*]: 284
D46.1–3 [*100.12–14*]: **367**, 372
D46.2 [*100.13*]: 256
D46.2–3 [*100.13–14*]: 325
D46.3 [*100.14*]: 355
D47.1–2 [*100.14–15*]: 275
D47.1–3 [*100.14–16*]: 207, **367–368**, 370
D47.2 [*100.15*]: 168
D47.2–3 [*100.15–16*]: 257, 259, 289
D47.3 [*100.16*]: 365
D48.1 [*100.17*]: 64, 191, 286
D48.1–2 [*100.17–18*]: 286
D48.1–4 [*100.17–20*]: 191, 192, 360, **368–369**, 369
D48.2 [*100.18*]: 32, 281, 283
D48.3 [*100.19*]: 230
D48.3–4 [*100.19–20*]: 285
D49.1 [*100.20*]: 283
D49.1–3 [*100.20–22*]: 143, 152, 178, 207, 358, **369**
D49.2 [*100.21*]: 263
D50.1–3 [*100.22–24*]: **369**
D50.1–4 [*100.22–25*]: 179, 202
D50.2–3 [*100.23–24*]: 370
D50.3 [*100.24*]: 64, 341
D50.3–4 [*100.24–25*]: **369**
D51.1–2 [*100.25–26*]: 143, **370**
D51.1–5 [*100.25–29*]: 143
D51.1–6 [*100.25–30*]: 282
D51.1–8 [*100.25–32*]: 190, 191, 346
D51.2–5 [*100.26–29*]: **370**
D51.4 [*100.28*]: 257, 259
D51.5 [*100.29*]: 205
D51.5–6 [*100.29–30*]: **370**
D51.6–8 [*100.30–32*]: 276
D51.7 [*100.31*]: 326
D52.1–2 [*100.32–33*]: **370**
D53.1–2 [*100.33–34*]: 313
D53.1–4 [*100.33–36*]: 322, **370–371**
D53–55 [*100.33–44*]: 16
D53.2 [*100.34*]: 64
D53.3 [*100.35*]: 241
D54.1–4 [*100.36–39*]: 322, 371, **371–372**
D54.2 [*100.37*]: 158
D55.1–4 [*100.39–42*]: **372**
D55.1–6 [*100.39–44*]: 175, 371
D55–58 [*100.39–101.2*]: 16
D55.2 [*100.40*]: 320
D55.2–3 [*100.40–41*]: 366
D55.4–6 [*100.42–44*]: 367, **372**
D55.5 [*100.43*]: 312, 366
D55.6 [*100.44*]: 256
D56.1–3 [*100.44–46*]: 204, 346, **372–373**
D56.3 [*100.46*]: 258, 366
D57.1–4 [*100.47–50*]: **373**
D57–58 [*100.47–101.2*]: 62
D57.2 [*100.48*]: 188
D58.1–4 [*100.50–101.2*]: 25 n. 40, **373–374**
D59.1–2 [*101.2–3*]: 374
D59.1–3 [*101.2–4*]: **374**
D59.1–7 [*101.2–8*]: 374
D59–60 [*101.2–11*]: 16, 57+n. 144, 62, 374
D59.3–5 [*101.4–6*]: **374**
D59.5–7 [*101.6–8*]: **374**
D59.6 [*101.7*]: 151
D60.1–4 [*101.8–11*]: **374–375**
D60.3 [*101.10*]: 158
D61.1 [*101.11*]: 165, 394
D61.1–2 [*101.11–12*]: **375**
D61.1–9 [*101.11–19*]: 376
D61–64 [*101.11–27*]: 44–45+n. 109, 57 n. 144, 62
D61.2 [*101.12*]: 38 n. 88, 381
D61.2–3 [*101.12–13*]: **375**
D61.3–9 [*101.13–19*]: **375–376**
D61.8 [*101.18*]: 397
D61.9 [*101.19*]: 158
D62.1–2 [*101.20–21*]: **376**
D62.2 [*101.21*]: 370
D63.1–3 [*101.23–25*]: 254, **376–377**
D64.1–3 [*101.25–27*]: 259, **377**

D64.3 [*101.27*]: 143
D65.1–2 [*101.28–29*]: 274
D65.1–3 [*101.28–30*]: 54+n. 137, 62, 347, **377**, 397
D66.1 [*101.31*]: 218, **377–378**
D66.1–3 [*101.31–33*]: 31+n. 64, **378**
D66.1–5 [*101.31–35*]: 16, 289
D66–69 [*101.31–42*]: 62
D66.3 [*101.33*]: 260, 293
D66.4–5 [*101.34–35*]: 328
D66.5 [*101.35*]: 306
D67.1–3 [*101.35–37*]: **378**
D68.1 [*101.37*]: 339
D68.1–2 [*101.37–38*]: **378**
D68–69 [*101.37–42*]: 210, 353, 378
D68–70 [*101.37–102.2*]: 274
D68.2 [*101.38*]: 136
D68.2–3 [*101.38–39*]: 355
D68.2–5 [*101.38–41*]: **378–379**
D70.1–5 [*101.42–46*]: **379–380**
D70.1–12 [*101.42–102.2*]: 47, 62, 227, 339
D70–71 [*101.42–102.8*]: 51
D70.4 [*101.45*]: 331
D70.5–8 [*101.46–49*]: **380**
D70.8–9 [*101.49–50*]: 379
D70.9–12 [*101.50–102.2*]: **380–381**
D70.10 [*101.51*]: 63
D70.11 [*102.1*]: 218
D71.1–3 [*102.3–5*]: **381**
D71.1–6 [*102.3–8*]: 62, 292
D71–72 [*102.3–12*]: 16
D71–75 [*102.3–27*]: 16
D71.2 [*102.4*]: 36+n. 83, 38+n. 88, 254
D71.2–3 [*102.4–5*]: 37 n. 87
D71.4–6 [*102.6–8*]: **381–382**
D72.1–4 [*102.9–12*]: 53+n. 133, 56, 62, 219, 304, **382–383**
D72–111 [*102.9–104.42*]: 51
D72.2 [*102.10*]: 356
D72.3 [*102.11*]: 385, 391
D73.1 [*102.12*]: 336, 382, **383**
D73.1–8 [*102.12–19*]: 20, 24, 154, 218, 338, 383, **383–384**, 414
D73–75 [*102.12–27*]: 53, 54, 62, 334, 382
D73–85 [*102.12–103.11*]: 382
D73.4–5 [*102.15–16*]: 261
D73.6 [*102.17*]: 385
D73.6–7 [*102.17–18*]: 325
D73.7 [*102.18*]: 325
D73.7–8 [*102.18–19*]: 149
D73.8 [*102.19*]: 284
D74.1–2 [*102.19–20*]: 256
D74.1–5 [*102.19–23*]: **384**
D74–75 [*102.19–27*]: 20, 415
D74.3–4 [*102.21–22*]: 146
D74.4 [*102.22*]: 316
D74.5 [*102.23*]: 256, 365
D75.1–2 [*102.23–24*]: 256, 325
D75.1–3 [*102.23–25*]: 180
D75.1–5 [*102.23–27*]: 23, **384–385**
D75.2 [*102.24*]: 149, 261
D75.2–3 [*102.24–25*]: 325
D75.3–4 [*102.25–26*]: 274, 365
D75.5 [*102.27*]: 25 n. 42
D76.1–2 [*102.27–28*]: **385**
D76–83 [*102.27–103.3*]: 55+n. 138, 62, 304, 347, 382
D76.2–3 [*102.28–29*]: **385**
D76.3–5 [*102.29–31*]: **386**
D76.4 [*102.30*]: 340
D77.1 [*102.31*]: **386–387**
D77.1–2 [*102.31–32*]: 389
D77.1–3 [*102.31–33*]: **387**
D77–82 [*102.31–50*]: 17, 55, 386
D77.3–6 [*102.33–36*]: **387**
D77.4 [*102.34*]: 256
D77.5 [*102.35*]: 36
D77.5–6 [*102.35–36*]: 361
D78.1–4 [*102.36–39*]: **387–388**
D78.2 [*102.37*]: 387
D79.1–2 [*102.39–40*]: **388–389**
D79–81 [*102.39–47*]: 388
D80.1–81.2 [*102.40–47*]: 17, 388, **389**
D80.4–5 [*102.43–44*]: 231
D80.5 [*102.44*]: 247, 248
D81.2 [*102.46*]: 26 n. 44
D82.2–4 [*102.48–50*]: 21
D82.3–4 [*102.49–50*]: 33 n. 72, 386, **390**
D83.1–5 [*102.50–103.3*]: 55, 348, 396
D83.2–5 [*102.51–103.3*]: **390–391**
D84.1 [*103.4*]: 338, 390, **391**
D84.1–2 [*103.4–5*]: **391**
D84.1–5 [*103.4–8*]: 179
D84–85 [*103.4–11*]: 56+n. 142, 59, 62, 219, 382, 391
D84.2 [*103.5*]: 63
D84.2–3 [*103.5–6*]: 395
D84.2–5 [*103.5–8*]: **391–392**
D85.2–4 [*103.9–11*]: **392–393**
D85.3 [*103.10*]: 391
D86.1–2 [*103.12–13*]: 374
D86.1–3 [*103.12–14*]: 306, **393**
D86–87 [*103.12–19*]: 346, 393
D86–100 [*103.12–51*]: 62
D86–110 [*103.12–104.40*]: 334
D86.1 [*103.12*]: 151
D86.2–3 [*103.13–14*]: 398
D86.3–4 [*103.14–15*]: 393

D86.3–5 [*103.14–16*]: **393**
D87.1–4 [*103.16–19*]: **393–394**
D87–88 [*103.16–25*]: 194
D87.2 [*103.17*]: 35
D87.4 [*103.19*]: 136
D88.1–3 [*103.19–21*]: **394**
D88.1–5 [*103.19–23*]: 55
D88–89 [*103.19–28*]: 179, 344
D88–100 [*103.19–51*]: 393, 394
D88.3 [*103.21*]: 369
D88.3–4 [*103.21–22*]: 28
D88.3–5 [*103.21–23*]: **394**
D88.4 [*103.22*]: 356
D88.5–6 [*103.23–24*]: 376
D88.5–7 [*103.23–25*]: **394**
D88.6 [*103.24*]: 261
D89.1–2 [*103.25–26*]: 394, **394**
D89.2 [*103.26*]: 230
D89.2–4 [*103.26–28*]: **394–395**
D89.3 [*103.27*]: 63, 377
D89.3–4 [*103.27–28*]: 274, 340
D90.1–3 [*103.28–30*]: 376, **395**
D91.1–3 [*103.30–32*]: 226
D91.1–92.2 [*103.30–33*]: 266, **395**
D92.2 [*103.33*]: 21, 158
D93.1–2 [*103.34–35*]: **395**
D94.1–2 [*100.35–36*]: 294
D94.1–3 [*103.35–37*]: 336, **395**
D95.1–3 [*103.37–39*]: **396**
D96.1–4 [*103.39–42*]: 210, 339, **396**
D96–97 [*103.39–43*]: 295
D96–98 [*103.39–45*]: 55+n. 139, 377
D97.1–2 [*103.43–43*]: **396**
D98.1–3 [*103.43–45*]: **397**
D99.1 [*103.45*]: 156n.
D99.1–6 [*103.45–50*]: 194, 336, **397**
D99.2–3 [*103.46–47*]: 376
D99.5–6 [*103.49–50*]: 151, 179
D100.1–2 [*103.50–51*]: **397**
D100–110 [*104.1–40*]: 62, 393
D101.1 [*104.1*]: 158
D101.1–2 [*104.1–2*]: **398**
D101.1–6 [*104.1–6*]: 36, 317, 339
D101–111 [*104.1–42*]: 16
D101.2 [*104.2*]: 312
D101.3–4 [*104.3–4*]: 312
D101.3–6 [*104.3–6*]: **398**
D101.4–6 [*104.4–6*]: 400
D102.1 [*104.6*]: 372
D102.1–4 [*104.6–9*]: 336–337, **398**
D102.2 [*104.7*]: 151, 396, 398
D103.1–2 [*104.9–10*]: **398**
D103.1–11 [*104.9–19*]: 339
D103.2–4 [*104.10–12*]: 354
D103.2–6 [*104.10–14*]: **399**
D103.3–4 [*104.11–12*]: 274
D103.6–11 [*104.14–19*]: **399–400**
D103.8–10 [*104.16–18*]: 400
D103.11 [*104.19*]: 398
D104.1–3 [*104.19–21*]: 178, 207, 283, 304, **400**
D104–105 [*104.19–28*]: 143, 401
D104.2 [*104.20*]: 263
D104.2–3 [*104.20–21*]: 259
D105.1 [*104.21*]: 400
D105.1–6 [*104.21–26*]: **400–401**
D105.3 [*104.23*]: 354, 393
D105.7–8 [*104.27–28*]: 290
D106.1 [*104.28*]: 394
D106.1–3 [*104.28–30*]: **401**
D107.1–4 [*104.30–33*]: **401**
D108.1–3 [*104.33–35*]: **401–402**
D108.3 [*104.35*]: 402, 403
D108.4 [*104.36*]: **402**
D109.1–2 [*104.36–37*]: 402
D109.2–4 [*104.37–39*]: **402–403**
D110.1–2 [*104.39–40*]: **403**
D111.1–3 [*104.40–42*]: 16, 20, 62, 328, 333, **403**, 416

Belopoiika 49.1: 22, 135
49.1–2: 218
49.1–3: 20
49.4–5: 218
50.3: 392
50.23–24: 275
50.45–51.11: 236
51.15–23: 22, 159
51.19–23: 23
51.34–44: 173, 279
51.36: 278
51.38: 318
51.42: 203
51.44: 279
51.49: 278
52.3: 147, 278
52.21: 158
52.33: 275
52.47: 187
53.7–8: 328
54.7–28: 203
54.47–50: 320
55.28: 334
55.30: 293
55.40–41: 293
55.47: 198
56.13: 20
56.16: 136, 335
56.19: 237

56.22–23: 22
56.27–30: 210
56.37: 164
56.42: 171
56.49: 394
56.50: 158
57.14: 335
57.26: 311
57.28: 356
57.30: 394
57.34: 311
57.37–38: 164
57.40: 171
57.46: 145
58.3: 392
58.4–5: 401
58.6: 171
58.32: 164
58.42: 291
59.9–10: 293
59.18–19: 20
59.19: 373
59.25: 373
59.42: 171
59.43: 158
60.16–17: 178
60.34: 171
61.7–8: 164
61.12: 158
61.21–22: 20
61.38: 247
61.40: 392
61.47: 203
62.12: 312
62.24–25: 217
62.25–34: 164
63.1–7: 328
63.3: 293
63.47: 311
64.2: 311
64.9: 334
64.18: 316
64.20: 311
66.41: 312
66.49: 378
67.1: 312
67.8: 237
67.23: 200
67.43–45: 22
67.44–45: 22
68.6: 203
69.7: 334
69.11–27: 359
69.48–49: 293
70.7: 248
70.9: 198
70.11: 199
70.13: 198, 356
70.21: 199
70.28: 277
70.42: 277
71.14–15: 259
71.38: 203
71.43–43: 256
72.10: 277
72.17–18: 401
72.19: 229
72.27: 229
72.29: 335
72.31: 335
72.36–43: 22
73.41: 293
73.43: 208
73.48: 237
74.5: 203
74.19: 325
74.22: 325
74.25: 237
74.27: 237
74.32: 237
74.42: 237
74.44: 237
75.21: 147
75.35: 208
75.37: 208
75.42: 237
76.12: 203
76.24: 158
76.25: 237
76.35: 164
76.37: 374
76.41: 171
76.44: 275
77.3: 275
77.6: 208
77.8: 208
77.15–17: 22
77.46–48: 22 n. 24
77.46–78.2: 22+n. 24
78.7: 237
78.15: 277

Pneumatika 1: 22, 23, 135
2: 23 n. 34
6: 23 n. 34
16: 23 n. 34
60: 23 n. 34

(ii) OTHER LITERARY SOURCES

Aelian
fr.70 Hercher: 301

Aeneas Tacticus
Pref. 2: 37 n. 86, 41, 51+n. 126
1.1: 34+n. 76, 49
1.2: 37, 150
1.2–3: 37
1.3: 46, 48
1.4: 48+n. 119
1.5: 177
1.6: 36 n. 83
1.8: 336
1.9: 38+n. 88, 292
1.9–2.1: 38
2.1: 38, 292
2.2: 35 n. 77, 37 n. 86, 292
2.3–6: 34 n. 75, 336
2.4: 38 n. 88, 46, 48, 381
2.5: 39
2.5–6: 258
2.6: 41, 42, 45, 297
2.7–8: 38
3: 38, 47
3.1: 35 n. 78, 38
3.1–3: 38–39+n. 92
3.2: 38 n. 88
3.3: 38
3.4–6: 39+nn. 92–93
3.5: 38, 38 n. 88, 49
3.6: 42
4.1–4: 34 n. 75
4.3: 38 n. 88, 298
4.8–11: 34 n. 75, 41
4.11: 41, 48
5: 40
5.1: 42, 396
6.1–7: 395
6.6: 43
7.1: 17, 336
7.2–5: 336
7.4: 17, 33 n. 72, 58, 220, 398
8.1: 37, 310
8.2: 35 n. 76, 310, 312
8.2–5: 58, 220
8.3: 28, 36
8.4: 37 n. 84, 43
8.5: 17, 33 n. 72
9: 49
9.1: 46, 336
10: 45, 48, 49
10.1: 44, 45, 47 n. 117
10.2: 48
10.3–5: 51
10.4: 17, 48, 51, 54, 335, 336
10.5: 45, 46, 47 n. 117, 48
10.7: 46 n. 116, 48
10.8: 46, 47 n. 117
10.9–10: 46, 48
10.10: 34 n. 75, 336
10.11: 35 n. 78, 47, 386
10.12: 35 n. 78, 36
10.13–14: 46
10.15: 37 n. 86, 38 n. 88
10.18–19: 50 n. 123
10.20: 47, 49
10.20–21: 34 n. 75
10.21: 34 n. 75
10.22: 34 n. 75
10.23: 35 n. 78
10.23–25: 42
10.25: 336
10.25–26: 263
11.1: 47
11.3: 190, 260, 313
11.3–5: 48
11.3–6: 34 n. 75
11.4: 164
11.6: 275
11.7–10: 34 n. 75
11.7–11: 38
11.11: 305
11.13: 34 n. 75
11.14: 38 n. 88
12: 47
12.1: 296, 307
12.1–5: 50 n. 123
12.2–4: 34 n. 75
12.4: 35 n. 78
12.5: 34 n. 75
13.1: 47
13.2–4: 47
13.3: 48, 294, 296, 307
14: 53, 58
14.1: 47, 49
14.2: 17, 33 n. 72, 220
15.1–4: 177
15.2: 49
15.5: 43
15.8–10: 34 n. 75
15.9: 35 n. 76
16: 49
16.2: 336
16.5: 206, 394
16.8: 394
16.11–12: 394

16.13: 36
16.14: 34 n. 75
16.14–15: 43 n. 105
16.15: 44, 258
16.21–22: 36
17: 54
17.1: 36, 51+n. 128, 54 n. 136, 335
17.2: 35 n. 76
17.2–4: 34 n. 75, 54
17.3: 37 n. 86, 46
17.5: 37 n. 86, 38 n. 88
17.6: 48
18: 48
18–20: 40
18.2: 336
18.8: 34, 390
18.13: 34 n. 75
18.16: 296
20.2: 169
20.4: 34 n. 75, 169
21.1: 17, 33 n. 72, 58, 220
21.2: 33 n. 72, 302
22: 295
22.1: 336
22.2: 37, 38 n. 88, 49, 382
22.3: 37 n. 87, 381
22.4: 37, 38, 38 n. 88
22.7: 46, 47
22.7–8: 17, 299
22.14: 43
22.17: 308
22.19: 36 n. 83, 49
22.20: 34 n. 75, 43
22.29: 49, 50 n. 123
23.2: 43+n. 107
23.4: 296
23.7–11: 46, 48
23.11: 390
24: 302
24–25: 17, 295
24.1: 302
24.2: 301
24.4: 45, 150
24.4–14: 34 n. 75
24.7: 41
24.8: 35 n. 77
24.14–15: 302
24.16: 302
24.17–18: 302
24.18: 43
24.19: 302
25: 300
26: 295
26.1: 38 n. 88
26.2: 49
26.3: 17, 295
26.4: 43
26.7–11: 50 n. 123
27.11: 43 n. 105
27.14: 44
28: 40
28.1–2: 295–296
28.1–3: 44
28.5: 34 n. 75, 46, 390
28.5–6: 258
28.5–7: 44
28.7: 364
29.1: 36 n. 83
29.4: 46
29.6: 38 n. 88
29.7: 44
29.10: 37
29.12: 36
30.1–2: 38 n. 88
31: 17, 33 n. 72, 386, 387
31.1: 367
31.4: 390
31.4–5: 388
31.7: 41
31.8–9: 43 n. 105
31.10–13: 17, 389
31.10: 388
31.12: 389
31.14–16: 387
31.15–16: 37 n. 86
31.25–27: 34 n. 75
31.28–29: 45
31.31–32: 43
32.1: 323, 364
32.2: 259
32.3: 276
32.4: 192
32.5: 324
32.7: 191, 286–287
32.8: 17, 206, 259, 390
32.9–10: 323
32.11–12: 288
32.12: 17
32–40: 37
33.1: 17, 168, 259, 282, 303, 304
33.2: 304
33.3: 259
33.4: 49
34.1: 17, 361
35.1: 259
36: 17, 208, 303
37.1: 17, 43 n. 104
37.1–7: 278, 359

37.2: 49
37.3: 17, 359
37.5: 359
37.6–7: 359
37.9: 258
38.2–3: 43
38.4–5: 50 n. 123, 379
38.7: 257, 275, 383–384
39.1–2: 17, 206, 298
39.3: 169
39.6: 390
39.6–7: 17, 325
40.1: 37, 156, 158
40.2: 34
40.3: 45
40.4–5: 41+n. 100
40.8: 17, 33 n. 72, 36, 58, 220, 266

Aeschines
3.122: 258
3.224: 302

Aeschylus
Agamemnon 1651: 301
Choephori 1033: 171
Persae 370: 390
402–405: 51 n. 126
Seven against Thebes [*Sept.*] 298: 215
fr.198 Radt: 224

Africanus, Sex. Julius
Kestoi 1.1.23–24: 169
1.2.101–102: 263–264
2.5.10–12: 264
2.6.7–10: 377
3.1.1–2: 238–239
See also under *Geoponica*

Agatharchides [FGrH 86]
F19: 309

Ammianus Marcellinus
20.7.17: 212
23.4.10: 324

Anatolius
See under *Geoponica*

Anaxandrides
fr. 42 K.-A.: 252

Andocides
1.127: 22
2.11–14: 263

Anthologia Palatina
6.104.3: 207
11.89.2: 365

Apollodorus Mechanicus
139.9–13: 310
139.11: 258
140.1–143.5: 365
140.10: 288
142.2: 277
152.12: 351
153.8-155-13: 363
157.7–158.3: 146
174.1–7: 352
175.2–188.9: 384
176.17–177.1: 351
177.4–5: 351
181.13–14: 351
182.7: 351
187.3: 281
188.6–9: 281
189.9: 280

Apollodorus Mythographus
2.39: 364

Appian
Annibaica 139: 368
140: 259, 263
Bellum Civile 1.112: 286
1.117: 256
1.118: 312
2.61: 255
4.13: 179
4.72: 392
5.33–49: 392
5.82: 402
5.119: 365
5.121: 392
Iberica 20: 353
204: 168
383: 274
412–427: 392
Illyrica 32: 259
Libyca 67: 259, 368
441: 146
573: 314
Macedonica 3.4: 385
Mithridatica 135: 318
141: 259
147: 392
189–190: 349
320: 192
324: 179

382: 179
Syriaca 57: 374

Apsyrtus
See under *Geoponica*

Apuleius (agricultural writer)
See under *Geoponica*

Aristeas, *Letter to Philocrates*
176–177: 388

Aristophanes
Acharnians 1176–1177: 330
Birds [*Av.*] 159–160: 225
1125–1129: 207
1134: 199
Clouds [*Nub.*] 20: 340
188–189: 243
1501: 209
Ecclesiazusae 1092: 243
Frogs [*Ran.*] 644: 327
754: 302
789: 302
Knights [*Eq.*] 762: 318
1321: 250
1336: 250
Lysistrata 705: 209
Peace [*Pax*] 307: 373
Plutus 70: 209
543–544: 249
Thesmophoriazusae 395: 157
Wasps [*Vesp.*] 379: 180
554: 302
1440: 331

Aristotle
de sensu 443b11–12: 266
Meteorologica 3.377b25–26: 199
Nicomachean Ethics [*EN*] 1.1102a21–23: 328
Politics 2.1265a9–10: 293
2.1268a16–35: 293–294
3.1279b2–4: 294
5.1313a7–8: 147
6.1319a17–19: 292
7.1329b36–38: 294
7.1330b32–1331a18: 133
7.1331a12–13: 153
7.1331a19–21: 162
Rhetoric 2.1378b35–36: 308
fr.106 Rose: 266

?Aristotle, *Athênaiôn Politeia*
69.2: 247

[Aristotle]
de coloribus 795b13–14: 248
Mechanica 853b39–40: 328
Oeconomica 2.1347a4–8: 149
2.1348b33–1349a2: 242
Problemata 874b12: 147
926a6: 243
926a19–20: 243
926b32–927a2: 240
927a35-b5: 228
963b9: 147

Arrian, *Anabasis*
1.2.4: 192, 397
1.8.1: 180–181
1.19.3: 401
1.19.10: 401
1.20.5–7: 197
1.20.8: 204
1.21.5–6: 152
1.21.6: 282
1.22.1–2: 283
1.22.2: 263
1.23.1–2: 152
2.1.2: 338
2.18–24: 137
2.18.3: 188
2.18.3–6: 257
2.19.1: 263
2.19.2: 281
2.19.5: 181
2.20.9: 316
2.21.1: 362
2.21.4: 137, 182, 321
2.21.5–7: 321
2.21.6: 322, 371
2.21.7: 321
2.22.4: 154
2.23.1–4: 321
2.24.1: 313, 355
2.26.2: 362
2.27.1: 339
3.29.4: 384
4.2.2: 362
4.4.2: 384
4.4.4: 384
4.18.7: 343
4.19.1–3: 384
4.21.10: 228
5.10.4: 357
5.20.8: 384
5.23.2: 187
5.24.4: 362
6.10.3: 384

6.23.6: 377
7.10.3: 308

Athenaeus, *Deipnosophists*
1.16C: 266
1.34B: 266
2.47E–F: 162
2.52A–54D: 247
2.54E–55B: 224
2.55C–F: 224
2.58D–F: 249
2.63D–67F: 243
2.68F–70A: 255
3.94C–101E: 229
3.106E–108A: 229
3.110B: 249
3.110B–C: 251
4.137F: 228
4.153B: 250
4.153C: 228
5.207A: 361
5.207B: 361
5.208C: 279
5.208D: 319
6.273F: 359
6.274C: 228
8.361E: 303
9.369E–370F: 255
9.406B–408B: 239
9.406C: 225, 229
10.447A–D: 266
12.535D: 313
13.585A: 258
14.621A: 361
14.646B: 251
14.646E: 251
14.651B–652B: 226
14.662D-E: 228
15.689B: 246

Athenaeus Mechanicus
8.7: 293
12.12–14.3: 363
14.7: 203
15.13: 18
15.13–18.7: 345, 409–411
16.3: 346
17.2: 351
18.3–7: 276
21.1–26.5: 345
22.1: 351
22.2: 345
22.11–12: 166
27.2–6: 206, 324
27.5–6: 280
31.6: 358
32.10: 287
34.5: 351
35.5–36.1: 351
37.4–8: 310
37.4–38.13: 365
39.7–8: 217, 396

Berytius
See under *Geoponica*

Bito(n)
51.6–56.8 Wescher (4.1–61 Rehm-Schramm): 324
52.4 (4.5): 155

Caesar
Bellum Civile 3.48: 255
Bellum Gallicum 7.23: 406
7.27: 343
7.77–78: 350–351
[8].40–43: 342

Callimachus
Hymns 4.238 (with scholion): 366

Cassianus Bassus
See under *Geoponica*

Cratinus
fr.300 K.-A.: 223

Ctesias [FGrH 688]
F34b: 283

Curtius Rufus, Q.
4.2.12: 326
4.3.24–25: 273
4.3.24–26: 326
7.11.12: 343
9.8.20–28: 264

Damegeron
See under *Geoponica*

Democritus (agricultural writer)
See under *Geoponica*

Demosthenes
8.45: 226, 230
18.178: 305
18.299: 152
19.272: 176

21.119: 302
22.15: 225
27.10: 387
27.43: 387
37.38: 359
54.4: 359
54.5: 403
55.5: 289

[Demosthenes]
10.16: 226, 230
34.37: 247
47.20: 261
50.4: 378
52.30: 264

De obsidione toleranda
5: 222
14: 281
19: 256
40–41: 201
150: 281

(***De re strategica*: see Syrianus Magister**)

Dexippus [FGrH 100]
F27.11: 179

Didymus (agricultural writer)
See under *Geoponica*

Dio Cassius [D.C.]
9.40.9: 390
27.93.4: 335
39.4.2: 362
39.43.4: 365
40.40.5–6: 311
48.14.1–3: 392
50.32.4: 339
50.34.4: 372
56.11.5: 339
56.14.1: 310
66.4.4: 192, 372
68.26.2: 362
69.4.4: 362
74.10.4: 166
74.11.2: 372
74.12.2: 322

Dio Chrysostom
Orations 6.39: 366

Diodorus Siculus
1.32.8: 309
1.35.10: 208
1.80.5: 249
2.8.2: 148
2.8.5–6: 188
2.10.5: 137
3.42.1: 22–23
4.3.4: 250
4.31.7: 258
5.21.5: 231
11.8.2: 356
11.10.2: 298
11.18.6: 402
11.52.2: 393
12.12.3: 310
12.33.3: 328
12.48.1: 401
12.49.5: 313
12.55.7: 392
12.61.3: 356, 401
13.13.6–7: 317
13.14.1–2: 316
13.16.5: 402
13.17.4: 353
13.26.2: 403
13.50.5: 367
13.55.1: 344
13.55.5: 356
13.55.5–57.7: 380
13.56.4: 356
13.56.7–8: 297
13.57.3: 359
13.58.3: 221
13.59.7: 356
13.59.8: 138
13.64.7: 356
13.66.1: 338
13.67.2: 367
13.67.3: 263
13.78.1: 402
13.85.5: 283
13.86.3: 342
13.96.1: 307
13.99.3: 402
13.99.4: 367
13.99.5: 178
13.109.3: 340
14.18.2: 338
14.18.5: 202
14.48.1: 334
14.48.2: 354
14.51.2: 259, 263, 282–283
14.53.1–3: 380
14.53.3: 379
14.53.4: 343

14.71.2: 253
14.72.5: 316
14.73.4: 371
14.87.5: 375
14.108.1: 377
14.108.1–2: 392
14.108.4: 283
14.111.1–4: 392
15.26.4: 356
15.30.4: 355
15.55.3: 400
15.75.1: 417
15.93.3: 355
15.95.1–2: 378
16.8.2: 373
16.38.3: 379
16.44.5: 201
16.49.1: 288, 342
16.52.4: 307
16.53.3: 347
16.74.2: 356
16.74.3: 288
16.74.5: 356
17.7.8: 301
17.12.5: 152
17.15.2: 403
17.21.6: 308, 309
17.22.1: 356
17.23.6: 334
17.24.4: 356, 373
17.25–26: 152
17.26.3: 263
17.40.4–5: 257
17.41.2–45.5: 272
17.43.1: 276
17.43.3: 288
17.43.4: 373
17.43.7: 322
17.43.8: 325–326, 371
17.43.10: 325
17.44.2: 367
17.44.4: 277
17.45.2: 139
17.45.4: 259, 276
17.46.1: 355
17.46.2: 322
17.46.3: 373
17.65.4: 309
17.67.5: 356
17.85.6: 356
17.87.4: 282
17.93.1: 188
17.94.3–4: 309
17.95.1: 205
17.103: 264
18.13.1: 356
18.13.2: 382
18.34.2: 181
18.34.4: 356
18.40.4: 309
18.45.2: 282
18.51.3: 297
18.51.4: 334
18.64.4: 313
18.70–71: 256
18.70.1: 297
18.70.2: 181
18.70.5: 138, 278
18.70.5–7: 152, 311, 373
18.71.2: 373
18.71.3: 282
18.71.3–4: 311
18.71.4: 373
18.72.6: 274
18.72.8: 402
18.74.3: 292
19.19.3: 228
19.21.3: 375
19.25.3: 307
19.36.1: 338
19.49.1: 338
19.49.1–3: 391
19.61.5: 392
19.68.1: 338
19.83.2: 311
19.84.2–4: 311
19.97.1: 375
19.106.4: 276
19.109.2: 293
20.1–2: 355
20.6.3: 339
20.9.1: 277
20.9.2: 399
20.15.1–2: 399
20.23.2–6: 209
20.31.3: 392
20.33.6: 291
20.42.2: 298
20.45.7: 356
20.48.3: 279
20.48.6–7: 283
20.48.8: 375
20.49.4: 293
20.49.5: 339
20.51.3: 402
20.63.5: 377
20.64.4: 392
20.67.2: 303

20.71.1: 380
20.75.1: 349
20.81–88: 159
20.83.1: 293
20.84.2: 350
20.84.3: 216, 297
20.84.4: 380
20.85.1: 354
20.85.3: 164, 293
20.85.4: 166
20.86.3: 317, 339
20.86.4: 356, 357
20.87.1: 159, 172
20.87.2: 263
20.88.8: 356
20.91–100: 159
20.91: 324
20.91.2: 203
20.91.3: 169, 345, 351
20.91.5: 164
20.91.6: 259
20.91.8: 159, 191
20.93.1: 152
20.94.1: 179
20.94.1–2: 359
20.94.5: 307
20.95.1: 358
20.95.5: 159
20.96.1: 239
20.96.6–97.2: 283
20.97.4: 152, 182
20.97.7: 159, 356
20.100.1: 297
20.100.4: 159
20.102.4: 155, 211, 223, 254
20.109.1: 152
22.10.4–7: 143
22.10.6: 356
24.1.1: 314
24.1.2: 204
31.35.1: 253
33.16.1: 259
34/35.34: 324
36.4.8: 349
36.11.1: 231

Diogenes Laertius
1.114: 244

Dionysius of Halicarnassus, *Roman Antiquities* [*AR*]
2.70.2: 337
3.32.4: 337
3.49.3: 356
3.65.4: 356
4.19.2: 356
6.1.4: 337
7.11.3: 337
8.17.2: 356
8.19.2: 356
9.16.7: 356
9.21.3: 356
20.1.7: 259

Diophanes
See under *Geoponica*

Dioscorides, *de materia medica*
1.123.1–2: 247
1.128.1–3: 251
2.6.1.5–6: 253
2.70.1–6: 376
2.70.5.1–6: 264
2.71.1.10–12: 224
2.72.1–2: 252–253
2.75.1.6–7: 224
2.97–98: 226
2.101–103: 246
2.104.1–2: 223–224
2.108.1–2: 225
2.109.1–2: 224
2.118.1–2: 249
2.120–121: 255
2.167.1: 255
2.170.1–2: 243
2.171.1–4: 243
3.27–29: 240
3.70.1–2: 252
3.121.1: 240
4.64.1: 226
4.137.1: 253
5.11.3.5–6: 253
5.107.1–6: 261

Diphilus
fr. 42 K.-A.: 402

Etymologicum Magnum
255.55–256.5: 372

Euripides
Ion 191–192: 364
Orestes 1477: 301

Eustathius
On *Iliad* 21.22: 319

Eutocius, *Commentarii in libros de sphaera et cylindro*
60.28: 18 n. 6
94.1–2: 351

Florentinus
See under *Geoponica*

Frontinus, *Stratagems*
1.5.6: 313
1.5.10: 347
3.1–2: 382
3.1–11: 21 n. 21
3.2.7: 335
3.2.8: 335
3.3: 382
3.3.2: 338
3.4: 382
3.4.5: 350
3.4.6: 219
3.5.1–3: 375
3.6.7: 390
3.7.1–5: 342
3.8.1: 138
3.9.5–6: 357
3.9.9: 347
3.12–18: 21 n. 21
3.13.1–8: 386
3.15.1–6: 219
3.15.3: 392
3.17.1–9: 150

Fronto (agricultural writer)
See under *Geoponica*

Galen
de alimentorum facultatibus 6.541.12: 229
6.546.12–547.9: 225
de anatomicis administrationibus 2.283: 329
de antidotis 14.184.8: 246
14.184.10: 246
de compositione medicamentorum secundum locos 12.608.6–8: 245
de simplicium medicamentorum temperamentis ac facultatibus 12.35.8–36.3: 240

Geoponica
2.4.1 (Paxamus): 240
2.5.14 (Paxamus): 267
2.10.8 (Anatolius): 229
2.18.6 (Africanus): 240
2.18.7 (Africanus): 229
2.18.11 (Africanus): 239
2.22.1–2 (Florentinus): 240
2.23.5 (Varro): 258
2.25.4 (Florentinus): 230, 233
2.27–30 (various): 425–427
2.27t (Tarantinus): 230
2.27.1 (Tarantinus): 232, 425
2.27.1–10 (Tarantinus): 425–426
2.27.2 (Tarantinus): 233, 425
2.27.3 (Tarantinus): 231, 238, 425
2.27.4 (Tarantinus): 425
2.27.5 (Tarantinus): 240, 425
2.27.6 (Tarantinus): 425
2.27.7 (Tarantinus): 229, 231, 233, 425–426
2.27.8 (Tarantinus): 426
2.27.9 (Tarantinus): 240, 242, 426
2.27.10 (Tarantinus): 426
2.28 (Africanus): 425, 426
2.28t (Africanus): 230
2.28.1 (Africanus): 426
2.29 (Sotion): 426
2.29.1 (Sotion): 240, 426
2.30 (Damegeron): 426–427
2.30t (Damegeron): 230
2.30.1–4 (Damegeron): 426–427
2.30.1 (Damegeron): 426
2.30.2 (Damegeron): 426–427
2.30.3 (Damegeron): 232, 427
2.30.4 (Damegeron): 427
2.39.5 (Florentinus): 224
2.43.1 (Paxamus): 253
3.3.4 (Varro and the Quintilii, citing Theophrastus): 240
3.13.3 (Varro and the Quintilii): 240
3.15.2 (Varro and the Quintilii): 239
3.15.6 (Varro and the Quintilii): 229
4.15.19 (uncredited): 250
5.8.7 (the Quintilii): 243
5.9.4 (Florentinus): 240
5.21.2 (Damegeron): 229
5.26.7 (Anatolius): 240
5.34.3 (Vindanionius): 240
5.35.1 (Democritus): 240
5.36.3 (Cassianus Bassus): 240
5.37.1 (Damegeron): 240
5.38.2 (Sotion): 229
5.44.1 (Diophanes): 202
5.49.2 (Africanus): 240
6.7.1 (Florentinus): 239
6.9.2 (Varro): 229
6.14.1 (Florentinus): 240
7.12.6 (Fronto): 239
7.17.1 (Diophanes): 229
7.20.7 (Pamphilus): 239
7.24.1 (Damegeron): 239
7.28.1 (Anatolius): 229

7.37.2 (uncredited): 249
8.3.1 (uncredited): 250
8.10t (uncredited): 240
8.14.1 (uncredited): 239
8.16.1 (uncredited): 250
8.24.1 (Berytius): 249
9.10.1 (the Quintilii): 240
9.10.8 (the Quintilii): 229
9.19.8 (Apuleius): 253
9.19.9–11 (Apuleius): 229
9.25.3 (Democritus): 239
10.18.3–4 (Anatolius): 240
10.19.1 (Berytius): 240
10.34.1 (Paxamus): 240
10.48.4 (Democritus): 229
10.59.1–3 (Africanus): 247
10.59.2 (Africanus): 240
10.61.1 (Democritus): 240
10.64.2 (Damegeron): 240
10.84.2 (Paxamus): 240
10.84.3 (Paxamus): 229
10.89.2 (Democritus): 240
10.90.1 (Florentinus): 240
10.90.3 (Florentinus): 240
11.7.7 (Florentinus): 240
11.18.7 (Didymus): 229
12.1.11 (uncredited): 239
12.6.1 (Democritus): 239
12.8.1 (Apuleius): 261
12.8.3 (Apuleius): 229, 240
12.12.1–7 (Damegeron): 249
12.13.1–15 (Florentinus): 255
12.14.1–2 (Didymus): 255
12.17.1–22 (Paxamus): 255
12.19.8 (the Quintilii): 250
12.19.9 (the Quintilii): 240
12.30.1 (uncredited): 250
12.30.5 (uncredited): 250
12.32.1 (Paxamus): 250
12.35.1 (Damegeron): 250
12.36.1 (Anatolius): 243
12.37.1 (Berytius): 243
13.4.2 (Paxamus): 240
13.4.5 (Paxamus, citing Tarantinus): 230
13.4.9 (Paxamus, citing Anatolius): 229
13.10.3 (Paxamus): 240
13.10.5 (Paxamus): 240
13.10.7 (Paxamus): 229
13.10.15 (Paxamus): 229
13.11.3 (Democritus): 240
13.11.5 (Democritus): 240
13.11.10 (Democritus): 240
13.12.5 (Berytius): 240
13.14.3 (Didymus): 261
13.14.4 (Didymus): 229
13.14.5 (Didymus): 251
13.15.2 (Pamphilus): 240
13.15.5 (Pamphilus): 229
13.15.7 (Pamphilus): 251
14.12.1 (Leontinus): 240
14.17.3 (Paxamus): 251
14.17.7 (Paxamus): 240
14.19.3 (Varro): 239
15.1.17 (Zoroaster): 240
15.1.24 (Zoroaster): 240
15.2.13 (Florentinus): 240
15.6.1 (Paxamus): 239
15.7.1–7 (Diophanes): 246
15.8.1 (Leontinus): 240
16.4.3 (Apsyrtus): 240
16.7.1 (Apsyrtus): 261
16.9.7 (Hierocles): 240
16.10.1–2 (Hierocles): 240
16.11.2 (Hierocles): 253
16.15.2 (Theomnestus): 240
16.17.1 (Pelagonius): 261
16.21.10 (Apsyrtus): 240
17.12.4 (Sotion): 240
17.14.6 (Paxamus): 229
17.20.4 (Didymus): 240
17.22.1 (uncredited): 240
17.23.1 (Florentinus): 240
17.24.1 (uncredited): 240
17.24.2 (uncredited): 261
17.28.1 (Florentinus): 229
18.2.4–5 (Florentinus): 240
18.2.6 (Florentinus): 239
18.8.3 (Didymus): 229
18.15.2 (Didymus): 229
18.15.3 (Didymus): 261
18.15.3–4 (Didymus): 240
18.15.6 (Didymus): 240
19.3.2 (Theomnestus): 229
19.9.1 (Didymus): 230
20.2.1 (Oppian): 229, 240
20.2.3 (Oppian): 240
20.3.1 (Didymus): 240
20.4.2 (Democritus): 240
20.46.5 (uncredited): 240

Hecataeus of Abdera [FGrH 264]
F25.80.5: 249

Hellenica Oxyrhynchia
21.2: 353

Herodotus
1.98.4–6: 284

1.113.2: 158
1.164.1: 284
1.174.4: 145
1.178–191: 150
1.178.2: 282
1.179.2: 209
1.180.2: 174
1.186.2: 148
1.191.3–4: 342
2.29.3: 211
2.37.5: 239
2.94.2: 250
2.121.γ1: 275
2.124.4–5: 234
2.124.5: 282
2.149.1–3: 188
3.79.1: 306
3.151.1: 284
4.41: 188
4.86.1–3: 188
4.200: 359
5.16.1: 157
5.23.2: 262–263
5.106.5: 327
6.96: 394
7.36.2: 362
7.36.4: 286
7.76: 195
8.8.1: 322
8.16.1: 399
8.28: 206
8.37.3: 357
8.115.3: 253
9.13.3: 403
9.15.3: 282
9.42.3: 379
9.97: 202
9.114–118: 219

Hero(n)
De automatis 20.1: 18 n. 6
Belopoiika 13.5: 203
20.2–3: 198
24.39–41: 145
30.10–11: 208
30.20–21: 208
74.5–9: 281
Pneumatika 1.19: 232

Herophilus
fr. 257 von Staden: 330
fr. 260 von Staden: 331

Hesiod
Works and Days [*Op.*] 41: 244

Hesychius, *Lexicon*
α 1717: 253
γ 443: 282
ε 1767: 322
ι 635: 312
ι 778: 224
ξ 79: 364

Hierocles
See under *Geoponica*

Hippocrates/Corpus Hippocraticum
Aphorisms 6.6: 195
de aëre aquis et locis 18.18–20: 224
de diaeta i–iv 2.45.5–7: 223
2.45.7–10: 226
2.45.14–16: 224
2.45.17–26: 226
2.54.37–38: 240
2.55.2–24: 251
2.55.24–28: 247
3.75.8: 253
de diaeta acutorum 10.71: 266
de diaeta in morbis acutis 17.28: 266
de fracturis 4: 330
de medico 14.6–8: 330
de morbis i–iii 3.12.9: 253
de mulierum affectibus i–iii 1.64.11–12: 240
de officina medici 2.2: 330
Epidemics 2.4.3 (= 6.4.11): 225
5.1.54 (= 7.76.6): 240
5.1.68: 239
7.1.65: 239
7.1.105: 240

Homer
Iliad 5.202: 274
7.12: 388
8.306–308: 226
11.69: 223
12.52: 209
12.90: 137
12.198: 137
12.223–224: 137
12.257: 137
12.291: 137
12.308: 137
12.418: 137
12.440: 137
13.589: 224
15.552: 223

16.228: 260
18.504: 234
Odyssey 3.406: 234
5.413: 321
5.488–490: 249
6.163: 227
22.481–482: 260

(?)Horapollo, *Hieroglyophica*
1.21: 351–352

Isaeus
4.7: 264

Isocrates
8.93: 51 n. 126

Josephus
Antiquitates Judaicae 2.45: 337
5.235: 337
5.324: 336
7.335: 256
9.221: 320
10.265: 189
11.99: 189
12.90: 388
13.240: 350
13.307: 189
14.402: 332
14.424: 364
14.426: 364
14.475: 278
15.131: 403
15.146: 403
15.197: 403
20.85: 189
Bellum Judaicum 1.75: 189
1.295: 332
2.435–436: 139
2.553: 324
3.121: 324
3.167: 172
3.171–175: 285
3.181–189: 342
3.187: 275
3.212: 356
3.223–224: 370
3.228: 259
3.249: 373
3.277: 239
3.481: 403
5.466–472: 139
5.512–518: 392
5.567–571: 392
6.27: 373
6.222: 373
7.296: 226
13.60: 145

Justin, *Epitome of Pompeius Trogus*
12.10.1–3: 264

Leontinus
See under *Geoponica*

Livy
1.52.4: 382
5.21.10: 297
8.16.9–10: 337
10.46.3: 343
21.8.5: 197
23.18.7: 343
23.18.9: 278
23.19.1–16: 392
24.34.9: 168
25.23.8–24.7: 338
26.48.5–13: 343
28.3.7: 208, 367
28.20.1–5: 384
33.5.5–12: 179
36.23.2: 192
36.23.3: 160
36.25.4: 138
37.14–15.2: 314
38.7.4: 359
38.7.6–7: 190
38.7.7: 279
38.7.11–13: 360
44.11.5: 160

Lucian
De domo 30: 301
Lexiphanes 1: 23+n. 30
Philopseudes 31: 258

Lycurgus
Against Leocrates 128: 289

Mantias
10 von Staden: 331
14 von Staden: 331

Miracula Sancti Demetrii
II 1.182–184: 314

Moschion [FGrH 575]
F1.2: 361
F1.4: 279, 319

Onasander
6.2: 392
6.10–12: 341
8.1: 344
10.7–8: 339, 340, 341
10.15: 349
22.1: 356
25–26: 295
26.1: 301
26.1–2: 300
27.1: 392
29.1: 357
33: 353
34.1–3: 379
35.1–3: 339
36.1–2: 309
38.1–6: 379
39.1: 385
39.4: 385
39.5: 385
40–42: 18–19
40.2: 344
41.1–2: 337
42.3: 324
42.6: 353
42.7–13: 356
42.11: 356
42.17: 357
42.18–22: 379
42.23: 350, 391, 392
42.24: 385

Oppian
See under *Geoponica*

Oribasius
Collectiones medicae 8.3.7: 366

Ovid
Ars Amatoria 3.619–630: 388
3.623–624: 388

Pamphilus
See under *Geoponica*

Parangelmata Poliorketika
197.7–198.7 Wescher (1.8–18 Sullivan): 19–20
203.2–4 (3.43–46): 20, 412
203.3 (3.44–45): 244
203.4 (3.46): 248, 412
204.8–18 (4.4–15): 20, 412
204.9–10 (4.5–7): 339, 412
204.10–13 (4.7–9): 353, 412
204.13–15 (4.10–11): 344, 356, 412
204.15–18 (4.11–15): 357, 412
207.12–16 (8.1–5): 20, 362, 412
209.3–212.10 (11.1–29): 20, 346, 413
209.4–6 (11.2–4): 362, 413
209.10–212.6 (11.9–24): 206, 413
209.12–13 (11.11–12): 366, 413
212.4–5 (11.23): 366, 413
212.6–7 (11.24–25): 358, 413
212.6–10 (11.24–29): 279
212.9 (11.28): 359, 413
212.11 (12.1): 335
212.11–12 (12.1–2): 20, 414
212.11–16 (12.1–6): 336, 414
212.11–214.3 (12.1–25): 20, 334, 383, 414
212.16–17 (12.6–7): 336, 414
212.18–20 (12.8–10): 337, 414
212.20 (12.11): 337, 414
213.1 (12.12): 337, 414
213.3–4 (12.14–15): 383, 414
236.4 (27.81–82): 261
246.14–248.3 (39.7–36): 304
247.6–15 (39.19–30): 352
247.16–248.2 (39.30–35): 276
259.1–13 (47.1–14): 20, 347, 414–415
259.13 (47.14): 361, 415
260.5 (48.1): 20
260.5–261.2 (48.1–13): 347, 415
260.7–11 (48.3–7): 384, 415
260.11–261.2 (48.7–13): 384, 415
261.3–10 (49.1–9): 20, 324, 325, 415–416
261.9 (49.7–8): 208, 416
272.6–7 (55.9): 280
276.15–17 (58.8–10): 20, 403, 416

Pausanias
1.13.8: 297
4.21.6: 297
4.29.5: 297
6.5.2–3: 417
8.8.7–8: 146, 342
8.8.9: 342
8.48.2: 227
9.19.8: 227
10.1.3: 206
10.19.1–2: 322

Paxamus
See under *Geoponica*

Pelagonius
See under *Geoponica*

Periplous Maris Erythraei
14: 252

Pherecrates
fr.12 K.-A.: 319

Pherecydes of Athens [FGrH 3]
F11: 364

Philemon
frs. 112–113 Kock: 331

Plato
Gorgias 480E: 215
527B: 215
Laches 183D: 365
184A: 365
Laws [*Leg.*] 6.760A–761A: 133
6.778D–779A: 133
7.793E: 309
9.857C: 329
10.903C: 327
Politicus [*Plt.*] 298C: 330
300E: 327
Republic 2.372C: 243
3.417B: 52 n. 130
4.424C: 215
10.608A: 215
Theaetetus 142B: 253

Pliny, *Historia Naturalis*
11.196: 229
20.100: 250
22.107: 331
22.117: 330
25.83: 224
28.131: 224
28.204: 224
33.94: 361
35.51: 265

Plutarch
Aemilius Paullus 20.8: 187
Alcibiades 15.5: 199
30.4–5: 263
31.6: 350
Antonius 67.3: 399
Aratus 6–8: 384
8.4: 381, 384
18.7: 171
40.7: 312
Artaxerxes 7.2: 188
8.2: 353
Caesar 6.6: 179
39.2–3: 255
Camillus 5.6: 179
34.2: 215
Cato Minor 59.4: 256
Cimon 13.6: 136
Crassus 2.5: 375
10.8: 339
Demetrius 20.8–9: 398
21.1–2: 324
33.6–34.3: 392
Dion 34.6–7: 144
48.2: 181
Lysander 7.4: 382
10.2: 401
13.3: 350
Marcellus 15.2: 281
15.3: 363, 367
16.2: 175
18: 338
Nicias 21.3: 374
Numa 9.3: 316
10.6: 303
13.2: 332
Pelopidas 1–2: 353
29.7: 417
31.4: 344
Philopoemen 5.1: 381
6.8: 213
7.9: 353
13.2: 223, 254
Phocion 19.3: 303
Pompeius 35.1: 312
78.2: 339
80.1: 303
Pyrrhus 31: 381
34.2: 297
Solon 14.2: 332
23.6: 188
25.2: 223
Sulla 12.2: 392
Themistocles 14.3: 401
14.4: 399
Moralia 58F: 209
171D: 303
176E-F: 377
190E: 382
200A-B: 311
229B: 382
293D: 239, 323
453B: 238
458E-F: 377
631E: 326
752B: 266
922B: 316
974E: 283
1095A: 222
fr.26 Sandbach: 244

Pollux
1.120: 365
1.137: 365
1.245: 258
1.248: 223
3.155: 366
6.33: 223
6.72: 223
9.107: 278
10.144: 365
10.149: 331
10.162: 301

Polyaenus
1 pref.3–4: 382
1.28.2: 258
1.39.2: 311, 366
1.40.9: 367, 401
1.48.2: 401
2.1.25: 312
2.1.33: 390
2.2.3: 353
2.2.8: 375
2.3.1: 335
2.4.3: 335
2.10.5: 382
2.18: 219, 347
2.29.1: 390
2.30.1: 307
2.33.1: 392
2.36: 397
2.38.1: 289
3.8: 294
3.9.30: 149
3.9.36: 376
3.9.42: 357
3.9.43: 397
3.10.1: 377
3.10.5: 340, 341
3.10.9: 341
3.10.12: 401
3.10.13: 399–400
3.10.14: 377
3.10.15: 259, 365
3.10.17: 399–400, 401
3.11.10: 393
3.11.13: 277
4.2.20: 362
4.3.3: 257
4.3.8: 378
4.3.17: 311
4.6.3: 259, 364
4.6.18: 338
4.18.1: 138
5 pref.: 396
5.1.3: 219
5.2.6: 351
5.2.7: 385
5.2.18: 390
5.5.1: 381
5.10.3: 347
5.23: 357
5.33.2: 347
5.44.5: 301, 393
5.47: 259
6.2.1–2: 378
6.3: 260, 283, 361
6.4.1: 223, 378
6.5: 312
6.12: 332
6.16.2: 268
6.17: 359, 360
6.18.2: 206
6.45: 335
6.46: 378
6.47: 219
7.6.8: 342
7.11.5: 278, 381
7.21.7: 378
7.30: 289–290
7.36: 219
8.11: 338
8.21: 179
8.23–24: 255
8.46: 317
8.68: 297
8.69: 297, 385

Polybius
1.9.3: 353
1.17.7–19.5: 392
1.18.3: 391
1.19.3: 370
1.22.3: 273
1.22.4–6: 188
1.23.5: 353
1.27.5: 400
1.30.9: 378
1.42.7: 204
1.42.12: 359
1.43.1: 307
1.44.1: 376
1.45.3: 355
1.48.2: 190
1.48.10: 382
1.50.6: 400
1.53.11: 274
1.55.4: 375

1.60.9: 402
1.66.3: 187
1.73.2: 317
1.76.7: 275
2.6.5: 393
2.25.5: 178
2.30.4: 275
2.30.9: 143
2.33.3–6: 143
2.55.1: 353
2.55.6: 381
2.66.2: 353
2.70.6: 392
3.11.1: 353
3.13.8: 309
3.17.4: 297
3.42.2: 375
3.42.8: 362
3.43.3: 315
3.48.2: 392
3.58.2: 348
3.68.8: 330
3.85.3: 340
3.90.2: 340
3.102.4: 181
3.113.8: 400
3.114.3: 144
3.115.7: 400
3.116.8: 356
4.18.3: 305, 337
4.18.11: 403
4.19.8: 180
4.26.4: 393
4.56.8: 312, 315, 339
4.57.11–58.12: 380
4.60.4–10: 380
4.61.7: 314
4.70–72: 333, 337
4.70.6: 353
4.71.3: 305
4.80.10: 374
4.83: 154
5.2.5: 152
5.4.2: 353
5.4.6: 139, 355
5.4.6–9: 333
5.4.8: 138
5.4.9–10: 373
5.20.4–5: 344
5.22.10: 353
5.30.5: 380
5.46.12–47.1: 206
5.60.1: 391
5.60.2–61.2: 391
5.60.3: 308, 343, 355
5.71.9–10: 342
5.73.6–7: 391
5.75.1: 375
5.75.2–6: 375
5.75.7–76.11: 375
5.88.1: 159
5.88–90: 159
5.89.2: 261
5.89.6: 235, 260
5.89.7: 260
5.91.4: 380
5.93.2: 137
5.94.9: 380
5.96.4: 305
5.97.5–6: 333
5.98: 333
5.98.3: 275
5.98.9: 275
5.99–100: 333
5.100.5: 138
5.100.6: 373
6.23.4: 144
6.23.7: 144
6.23.10: 325
6.24–42: 39
6.24.9: 394
6.34.1: 152
6.39.3–4: 359
6.39.5: 343
6.42.2–5: 344
7.1.3: 392
7.17.7: 353
7.18.3–10: 380
8.5.6: 168
8.5.8–9: 319
8.5.8–10: 281
8.6.2: 281, 367
8.6.10: 30 n. 58
8.7.3: 168
8.13.5: 355
8.17.4–8: 387
8.37: 337–338
9.13.9: 295
9.17.9: 295, 302
9.18.3: 275
9.19.5–9: 333
9.41.1–7: 191, 346
9.41.4: 288, 351
9.41.5: 352
9.41.8: 166, 172, 319
9.41.9: 191
10.3.7: 353
10.9.7: 338

10.11.6: 342
10.13.1–5: 353
10.14.3: 355
10.15–17: 380
10.24.2–5: 353
10.27.10: 361
10.31.8: 201, 203, 205, 209
10.31.13: 373
10.32.7–33.7: 353
10.41.2: 353
10.43.10: 271
10.44.2–4: 267
10.44.5–6: 268
10.44.7–13: 269
10.44–45: 17
10.45.5: 270
10.45–47: 270
11.2.9–11: 353
11.3.1: 392
11.21.1: 397
11.24.1: 275
11.34.10–12: 377
12.25a.3: 355
14.4.3: 275
14.4.10: 402
14.9.9: 334
14.10.9–12: 316
15.1.8: 403
15.15.7: 180
16.1.5–6: 254
16.3.12: 402
16.3–4: 402
16.4.5: 402
16.4.14: 402
16.11.3: 138
16.11.5–6: 139
16.30.1: 315
16.30.2: 53
16.31.1–2: 297
16.31.8: 359, 373
16.33.1: 356, 373
16.33.4: 373
18.6.4: 254
18.14.1: 323
18.18.2–18: 179
18.27.3: 379
18.30.7: 144
18.53.10: 302
21.27–28: 279
21.27.4: 281, 319
21.27.4–5: 365
21.28.2: 288, 373
21.28.4: 190–191
21.28.4–5: 346
21.28.7: 279
21.28.7–9: 359
21.28.7–10: 279
21.28.12–17: 360
29.9.10: 392
30.11.2: 393
32.15.14: 253
33.6.7: 373
33.19: 311
34.9.15: 266
34.10.12: 250

Posidonius [FGrH 87]
F1: 228

Procopius
De bellis 6.2.14–31: 330
6.5.24–27: 330

Quintilii brothers
See under *Geoponica*

Septuagint [LXX]
2 Chronicles 36.19: 189
Daniel 8.2: 189
Deuteronomy 28.28: 285
28.52: 390
Ezechiel 4.2: 166
41.16: 362
Genesis 41.56: 233
Judges 5.28: 168
16.9: 262
Judith 9.7: 359
Joshua 8.18: 359
2 Kingdoms 20.15: 320
Numbers 6.3: 252
Proverbs 29.16: 344
Psalms 44.9: 189
47.14: 189
121.7: 189
Psalms of Solomon 8.19: 189

Servius
On *Aeneid* 9.503: 364
On *Georgics* 1.164: 207

Sophocles
Trachiniae 1181: 302

Sotion
See under *Geoponica*

Stobaeus, *Anthologium*
2.4.3: 331

Strabo
2.1.11: 180
2.3.4: 252
4.4.1: 365
4.4.3: 326
4.6.12: 250
5.1.12: 226
5.4.10: 392
7.3.7: 224
12.8.15: 211
14.1.35: 227
14.2.5: 227
14.5.6: 340
15.1.36: 168
15.1.67: 261
15.3.10: 223
16.4.24: 252
17.2.2: 252

Suda
κ 699: 176
ο 386: 18
π 253: 267
σ 339: 225

Sylloge tacticorum
4.1–2: 353
53.1: 337
53.7: 239
55.2: 267
57.1: 377
76.1–4: 387

Synagoge
π 269: 371

Syrianus Magister
12: 19
12.3–4: 152
12.4: 154
12.4–6: 152
12.6–7: 154
12.10–11: 139
12.11–13: 140
12.13–14: 139
12.18–19: 195
12.26–30: 153
12.28: 153
12.37–55: 201
12.38–42: 204
13: 19
13.5–12: 138
13.31–34: 279
13.35: 359
13.55–56: 288

Tarantinus
See under *Geoponica*

Teles
Περὶ αὐταρκείας 13.6–7: 224

Theognis
639–640: 396

Theomnestus
See under *Geoponica*

Theophrastus
De causis plantarum (*CP*) 3.20.1: 238
3.20.6: 238
5.15.5: 253
De igne fr.61: 361
De lapidibus 65: 137
Historia plantarum (*HP*) 2.2.8: 227
3.3.5: 227
3.8.2: 253
4.15.3: 224
6.2.6: 240
7.4.12: 243
7.12.1: 243
8.8.3: 229
8.11.6: 224
8.11.7: 238
9.13.2: 224
9.16.5: 195
See also under *Geoponica*

Theopompus [FGrH 115]
F45: 224

Thucydides
1.29.3: 317
1.50.1: 401
1.69.5: 391
1.83.2: 347
1.93.5: 148, 206
1.110.2: 169
1.134.2: 289
2.2–6: 336
2.2.4: 381
2.3.3: 258
2.4.2: 42, 297
2.14.1: 44
2.15.2: 337
2.36.3: 228
2.70.1: 58 n. 147, 392
2.75.1: 320

2.75.4: 236
2.75.5: 277
2.76.2: 138, 179
2.76.3: 152, 182, 288
2.76.4: 192, 281
2.77.3: 320
2.77.4: 259
2.84.3: 364
2.94.4: 313
3.3.3: 335
3.3.5: 335
3.21–23: 337
3.23.1: 169
3.23.2: 209
3.23.4: 209
3.39.7: 403
3.52.1: 392
3.56.2: 335
3.65.1: 335
3.74.1: 297
4.25.4: 367
4.26.5: 249
4.26.8: 180
4.32.3: 215
4.36.3: 215
4.67.3: 317
4.69.2: 199, 290, 312
4.84.1–2: 336
4.100.1–4: 284
4.100.4: 259
4.108.1: 262
4.115.1: 290
4.115.2–3: 284
4.116.2: 343
5.55.3: 331
5.82.6: 199
6.3.1–4.1: 381
6.11.1: 392
6.51.1: 150
6.101.2: 312
7.4.4: 312
7.22.2: 312
7.25.2: 262
7.34.5: 401
7.36.6: 312
7.41.2–3: 319
7.42.5: 392
7.44: 302
7.59.2–3: 316
7.62.3: 367
7.65.1: 367
7.69.2: 51 n. 126
7.75.3: 306
7.80.6: 312
7.81.3: 394
8.27.4: 306
8.42.3: 401
8.53.2: 401
8.90.4: 312
8.94.3: 312
8.107.1: 357
8.108.3: 393

Varro
See under *Geoponica*

Vegetius
4.2: 167, 212
4.5: 201
4.6: 323
4.7: 254, 351
4.8: 256
4.9: 256
4.12: 357
4.19: 285
4.20: 206
4.23: 192, 276, 281, 367
4.24: 138
4.25: 297
4.26: 43 n. 106

Vindanionius
See under *Geoponica*

Vitruvius, *De architectura*
1.1: 404
1.2–3: 404
1.4: 404
1.5: 18, 404
1.5.1: 136, 137, 404
1.5.1–6: 404, 405
1.5.2: 145, 167, 192, 405
1.5.3: 155, 161, 404, 405–406
1.5.4: 157, 158, 167, 197, 406
1.5.5: 140, 199, 406–407
1.5.6: 201, 211, 407
1.5.7: 404, 407
1.5.8: 18 n. 7, 265, 404, 407–408
1.6: 404
1.7: 404
3 pref. 4: 404
3–4: 404
7 pref. 12: 18 n. 8
7 pref. 14: 18
7 pref. 17: 18 n. 8
10.4.2: 283
10.11.9: 287
10.13.3: 362

10.14.1: 345
10.14.1–3: 409–411
10.15.3: 345
10.16.4: 324
10.16.4–8: 206
10.41.1: 287

Xenophon
Agesilaus 2.8: 344
Anabasis 1.5.10: 377
1.5.12: 258
1.7.7: 307
1.7.9: 353
3.3.17: 293
3.4.3–4: 357
3.4.10: 234
3.4.19: 392
3.4.36: 347
3.4.37: 393
3.5.9–11: 384
4.2.1: 357
4.2.3: 310
4.2.7: 357
4.2.20: 310, 357
4.3.6: 281
4.3.29–32: 357
4.4.13: 247
4.5.14: 289
4.5.26: 266
5.1.8: 150
5.2.5: 205
5.2.13: 400
5.5.14: 377
6.4.3: 188
6.4.5: 262
6.5.1: 312
6.5.25–27: 357
6.6.35: 306
7.2.6: 307
7.4.16: 353
7.5.12: 226
7.8.13: 284
7.8.14: 291
Cynegeticus 3.6: 327
10.1: 195
Cyropaedia 1.4.8: 209
3.3.3: 293
5.3.47: 330
6.1.23: 395
6.1.53–55: 32 n. 66
6.2.18: 32 n. 66
6.2.34: 258
7.5.18: 136
8.2.24: 231
Hellenica 1.3.19: 350
1.5.21: 392
2.2.1–23: 392
2.2.2: 350
2.2.4: 274, 334
2.3.31: 240
2.4.4: 393
2.4.8: 150
2.4.27: 257, 323
3.1.17: 331
3.2.14–15: 216
3.5.4: 377
3.5.20: 310
4.2.19: 305
4.4.10: 180
4.4.15: 393
4.8.30: 393
4.8.37: 309
5.2.4: 219
5.2.4–5: 342
5.2.5: 137
5.3.26: 392
5.4.7: 296
6.2.20: 216
6.2.27: 317
6.2.28: 401
7.1.19: 316
7.1.21: 305
7.2.8: 223
7.3.1: 33
7.4.32: 312
7.5.14: 336
Hipparchicus 6.2: 309
8.24: 353
9.7: 297
Memorabilia 2.10.4: 242
3.1.3: 392
3.1.11: 340
Oeconomicus 8.9: 239
8.13: 162
18.6: 230
On horsemanship 3.8: 385
Symposium 2.18: 162

[Xenophon], *Athênaiôn Politeia* ("Old Oligarch")
2.11: 262

Zonaras, *Epitome historiarum*
1.327: 145
8.16: 313

Zoroaster (agricultural writer)
See under *Geoponica*

(iii) INSCRIPTIONS AND PAPYRI

ABSA 88 (1993) 187–217: see SEG 43.311

ArchEph 1967, 115–128: 159, 210

Austin² no.48: see Syll.³ 344
no.90: see ISE 114
no.115: see Maier no.82
no.135: see Syll.³ 976
no.144: see Syll.³ 528
no.145: see IG xii.6 1/12
no.225: see OGIS 748
no.230: see OGIS 266

Bagnall/Derow² no.7: see Syll.³ 344
no.23: see OGIS 266
no.31: see Robert
no.75: see Syll.³ 344
no.100: see PCair.Zen. 59823
no.104: see SB 18.13881

BCH 115 (1991) 299–302 [77 (1953) 387–392]: 308–309
136–137 (2012–2013) 339–361: 216

Burstein no.27: see SEG 27.513
no.66: see ISE 114

Harding no.134: see Maier no.11
no.135: see IG ii² 1487

I.Alexandreia Troas 1: 162
2: 162

I.Cret. I viii 7: 329
I ix 1: 335
IV 168: 328

I.Eph. 274: 341

IG i³ 78: 230
89: 263
117: 263

IG ii 167: 157

IG ii² 244: see Maier no.10
463: see Maier no.11
659: 260
665: 176
900: 176
944: 176
1006: 176
1008: 176
1009: 176
1011: 176
1028: 176
1487: 293
1622: 383
1627: 383
1632: 180
1606: 399
1648: 180
1668: 198
1672: see Maier no.20
9979: 176
11965: 216

IG ii³ 429: see Maier no.10
1229A: 176

IG iv² 1 102: 235

IG v.1 1379: 242

IG vii 3073: 237
4263: 144

IG xi.2 154: 383
161: 383
163: 183
287: 233, 370

IG xii.3 30: see Maier no.48

IG xii.5 824: 329

IG xii.6 1/12: 329

IG xii.7 36: 374
506: 380

IG xii Suppl. 250: 330
644: 238

IG xiv 421: 23 n. 29

IGR IV 737: 234

I.Perge 12: 328

ISE 114: 295, 308, 341, 342, 345

I.Smyrna 516: 217

Maier no.10: 139, 174, 198, 313
no.11: 144, 155, 156, 157, 164, 174, 183, 231, 235, 316
no.13: 210
no.14: 210
no.15: 210
no.16: 210
no.20: 139, 144, 235
no.22: 210
no.23: 210
no.24: 210
no.25: 210
no.25bis: 210
no.26: 144, 210
no.27: 210
no.30: 210
no.32: 210
no.33: 210
no.35: 201–202
no.36: 210
no.38: 210
no.44: 210
no.46: 190, 210
no.48: 136, 210
no.49: 136, 144, 210
no.50: 210
no.52: 210
no.53: 210
no.60: 210
no.62: 161
no.63: 144
no.65: 284
no.66: 144
no.68: 144
no.69: 210
no.71: 151, 173
no.72: 210
no.80: 210
no.82: 144, 210
no.83: 210
no.84: 144
no.86: 210
no.87: 210
no.88: 144, 210

Νέον Ἀθήναιον 1 (1955) 9–14: 321

OGIS 56: 337
266: 309, 342
748: 375

PCairZen 59823: 331

PLond 2.90.37: 226

POxy 1241: 364

PSI 4.358: 233

PTeb 112: 247, 255
230: 359

RO no.12: see Syll.³ 135

L.Robert, *Hellenica* XI–XII (1960) 507–508: 373

Samama no.126: 328
no.127: 329
no.130: 329
no.166: 329
no.168: 329
no.341: 328

SB 18.13881: 153

Schwenk no.3: see Maier no.10

SEG 2.829: 153
2.583: 161
4.446: 174
14.67: 321
24.154: 43 n. 106
26.1334: 337
27.513: 329
32.795: 210
35.1151: 284
35.1381bis: 210
36.765: 329
36.788: 243
38.1476: 210
41.76: 43 n. 106
43.311: 29 n. 50, 151, 173–174, 417–424
47.1646: 210
48.1344: 210
49.1536: 210
54.749: 329
56.1799: 332

SGDI 3340: 372
3486: see Maier no.48
5597: see Maier no.71

Staatsverträge 480: 381
481: see OGIS 266
543: 385

Syll.³ 135: 260, 262, 263
247: 169

344: 241–242
364: 292
375: 260
385: 176
390: 380
421: 174, 381
437: 329
495: see Maier no.82
528: 328–329
544: 144
569: 190
620: 329
675: 374
685: 174
839: 341
936: 151
958: 176
961: 290
968: 243
969: 198
972: 237
976: 242
1027: 247
1061: 176
1182: 151
1249: 176

GREEK INDEX (SELECT)

ἄγκιστρον 385
ἀγκιστρωτός 325
ἀγκύριον 371
ἀγκυρωτός 208
ἀγχιβαθής 321
αἰγίλωψ 253
αἱμασία 369
ἀκμάζειν 356
ἀκάτιον 317
ἀκόντιον 291
ἀκρότομος 200
ἀκρωτηριάζειν 399
ἀλείφειν 231
ἄλσος 253
ἄλφιτα 223, 239, 249
ἅμαξα 258
ἀμαξήλατος 206
ἄμη 258
ἀμητός 336
ἄμμα 385
ἄμοργος 229
ἀμύγδαλον 247
ἀμφίβληστρον 325
ἀμφίβολος 215, 323
ἀμφίπλευρος 169
ἀμφοδάρχης 295
ἄμφοδον 39–40, 290–291
ἀμφορεύς 318
ἀνάβασις 365
ἀναβιβάζειν 307
ἀναβολή 205
ἀναζευγνύειν 393
ἀνακαθαίρειν 366
ἀναχώρησις 214
ἀνήκεστος 403
ἀνὴρ ἀγαθός 216, 307
ἀνθιστάναι 278
ἄνθος χαλκοῦ 387
ἀνθυπόρυξις 358–359
ἀνθυπορύσσειν 358–359
ἀντιμεταλλεύειν 359
ἀντίπαλος 397
ἀντίπρωρος 401
ἀντιταφρεύειν 298
ἀντίτονον 363
ἀντλητήριον 372
ἀντοικοδομεῖν 288
ἀπάλλαξις 403
ἀπόβασις 403
ἀποικοδομεῖν 289
ἀποκόπτειν 148–149
ἀποσταυροῦν 312
ἀποστερεοῦν 137, 164
ἀποστρέφειν 341
ἀπότμησις 371
ἀποχαρακοῦν 312
Ἀραβικὸν φάρμακον 263
ἄρακος 228–229
ἀργομέτωπος 174
ἄρον 255
ἁρπάγη 372
ἅρπη 364
ἄρτυσις 228
ἄσηπτος 222
ἄστυ 35
ἀσφαλῆς 391
αὐτάρκεια 228
ἀφέψειν 250
ἄφρακτος 400
ἀχαλέπως 286
ἀχρεῖος 378
ἄχυρον 370
ἀχυροῦν 231
ἀψίς 160, 234

βᾶρις 30, 189–190, 197
βέλος 28, 30–31, 257
βελόστασις 166, 175
βιάζεσθαι 290
βοήθεια 151
βοηθεῖν 151
βοήθημα 273
βόθρος 366
βολβός 243
βουπόρος 291
βούτυρον 252–253
βρόχος 285, 325, 368, 372
βρῶμα 248–249
βύρσα 259

γαισός 359
γέρρα 282
γερροχελώνη 32, 327, 353
γεώργια 340

γίγαρτον 251
γιγγλυμωτός 280
γί(γ)νεσθαι 331, 396
γύψος 137

δάκτυλος 13
δᾶς 263
δαψιλῶς 374
δεῖ 25–26, 49
δεκάζειν 397
δελφίς 318–319
δενδρυάζειν 372
δέρμα 259
δέρρις 259, 277
δεσμός 277
δημοσίᾳ 221
διαβάθρα 284
διακινδυνεύειν 158
διάλειμμα 186–187
διαλείφειν 231
διαλλαγαί 385
διαμίσγειν 240
διαρπαγή 379
διασκάπτειν 354
διασκεδαννύναι 305
διασκευάζειν 305
διασπᾶν 180
διάσπασις 355
διὰ τέλους 154–155
διατήκειν 250
διαφρακτέον 323
διαχρίειν 252
διέκπλους 399
διεκπνοή 233
διέξοδος 189
δίκελλα 258
δίκτυον 325
δίοδος 169, 209
διπλοῦς 302–303
δοκιμάζειν 258–259
δοκίς 168–169, 208, 367
δοκός 183
δορυβόλον 320
δορυδρέπανον 365
δράγμα 223
δρέπανον 364–365, 367, 368
δυσδιάσπαστος 180
δυσεκπόρευτος 145
δυσέμπρηστος 178
δυσεντερία 253
δυσπέρβατος 180
δύσχρηστος 171

ἔγκλισις 173, 236–237
ἐγκρύπτειν 248, 249
ἐγχειρίδιον 301
ἔγχωσις 369
ἔδαφος 136, 166–167
ἐθίζειν 385
εἶδος 390
εἰκῇ 275
εἰσελαύνειν 376
εἰς θυίαν ἐμβάλλειν 248
εἰσφορά 380
ἐκ διαδοχῆς 270, 356, 412
ἔκθεσις 173
ἐκθλίβειν 392
ἐκκοιτία 294
ἐκκόπτειν 341
ἔκλυτος 204
ἐκπηδᾶν 353
ἐκπορεύεσθαι 150
ἐκτεύς 14
ἐκτὸς βέλους 339
ἐκτραχηλίζειν 209
ἐκτρυπᾶν 286, 322
ἐκτρύπησις 371
ἔλαιον 247, 265
ἑλέπολις 324
ἐμβάλλειν τὴν δεξίαν 301–302
ἔμβλημα 388–389
ἐμβολεύς 198
ἐμβόλιον 325
ἔμβολος 316
ἔμπειρος 329, 354
ἐμπήγνυσθαι 314–315
ἐμπηδᾶν 274
ἐμπιμπράναι 402
ἐναρμόζειν 237
ἔναψις 180, 355
ἔνδεσις 363
ἔνδον 165
ἐνδρομίς 366
ἐνεργεῖν 328
ἐνεργός 297
ἐνετήρ 32, 283–284, 368
ἔντεχνος 327
ἐξαγοράζειν 38 n. 88, 375
ἐξαγωγίς 370
ἐξαίρεσις 329
ἔξω βέλους 339
ἐπαλλάττειν 315
ἔπαλξις 30, 149
ἐπαρχία 340
ἐπιβάθρα 284
ἐπίδεσμος 331

ἐπίθεσις 305
ἐπίκαιρος 381
ἐπικάμπιον/ἐπικάμπιος 149, 173–174, 423
ἐπιλαμβάνεσθαι τῆς χλαμύδος 302
ἐπίπλους 400
ἐπιρρίπτειν/ἐπιρριπτεῖν 325
ἐπίρρυτος 240–241
ἐπίστασις 145–146
ἐπιτειχίζειν 391
ἑπτάκλινος 162
ἐργωδῶς 195
ἐρέβινθος 223–224
ἐσχάρα 287, 314
ἐσχάριον 287
ἑτερόπλευρος 169
ἕτοιμος/ἑτοῖμος 337
εὐεπίβατος 312
εὐεργῶς 199
εὐθυωρία 174
εὐκόπως 335
εὐλάβεια 215
εὔνους 309
εὐπρόσοδος 400
εὑρεῖν 185–186
εὔρυθμος 236
εὐρυχωρία/εὐρύχωρον 38, 174, 176, 291–292
εὐτάκτως 306
ἐφθός 248
ἔφιξις 169
ἐφοδεία 294
ἐφορμεῖν 322, 339
ἐφορμίζειν 322

ζεῦγμα 317
ζβύνη 291
ζωμός 253

ἡλισμένα 228
ἧλος 311
ἡμίεκτον 14, 247
ἡμίχουν 14, 247

θέρμος 224
θησαυρίζειν 231
θλίβειν 392
θόρυβος 357
θραύειν 145
θρίδαξ 255
θύλακος 276
θύρα 311

ἰδιώτης 230
ἱκανός 152
ἵκριον 156–158
ἱμητός 312
ἰξός 264, 361
ἱππάκη 224
ἱστιοδρομεῖν 402

καθαιρεῖν 390
καθαίρεσις 289
κάθαρσις 250
καθυστερεῖν 392–393
καιρός 397
κακοῦν 393
καλάμη 235
κάλαμος 235
καλῴδιον 180, 385
καλῶς ἔχοντα 342
κάμαξ 208
καμάρα 235
καμπά 423
καπνίζειν 359
καρβάτιναι 289, 378
κάσσυμα 389
καταγνύναι 168
καταδύνειν 401
κατακλείειν 237
κατακρεμανύναι 275
κατάκρουσις 147
καταλείφειν 231
καταμετρεῖν 198
κατὰ μέτωπον 282
κατάντης 309–310
κατάξυρος 165, 168, 282
καταπάλτης 28, 31, 257
καταπελταφέτης 176
καταπεταννύναι 277
καταπιμπράναι 402
κατασκάπτειν 341
κατασκευάζεσθαι 293
κατάσκοπος 396
καταστεγής 363
κατάστεγος 155
καταστρατοπεδεύειν 397
καταστρέφειν 176
κατάστρωμα 399
κατὰ τρόπον 245
κατατυγχάνειν 305
κατάφοβος 344
καταφορά 143–144
κατάφρακτος 354, 363
καταχωννύναι 370
κατεργάζεσθαι 238
κατορθοῦν 392
καυσία 301, 387

κάχρυ 222–223
κάχρυς 222–223
κέγχρος 226
κεραία 281, 368
κεραμίς 360–361
κηκίς 387
κηρωτή 330–331
κλεῖθρον 313
κλιμακίς 203
κλίνη 162
κλίσις 177
κλοπή 53–54, 334, 382, 383–385
κολοκύνθη 255
κόλπος 214, 313
κοντός 364
κόνυζα 239–240
κοπεύς 208
κόραξ 286, 368
κορμός 286
κοτύλη 14, 247
κόφινος 257
κράμβη 255
κραταιός 153
κρεμαστός 227–228
κρίθινος 266–267
κρίκος 285, 368
κριός 32, 156, 285, 368
κριόστασις 287
κριοφόρος 363
κρυφαίως 390
κύαθος 14, 267
κυκεών 250
κύκλος 29 n. 50
κυρεύειν 158
κωνοειδὲς σχῆμα 232
κώπη 262–263

λαμπάς 263
λαμπτήρ 295
λεηλατεῖν 393–394
λεία 376, 393–394, 394
λειτουργία 380
λέμβος 315–316
λεπίζειν 247, 247–248
λεπίς 351, 360–361
λεπτά 315
λήκυθος 389
λιβανωτίς 222
λιθοβόλος 28, 31, 378
λιθουργός 199
λιμός 56–58, 382, 391–393
λίνον 324
λογίζεσθαι 340
λόγχη 292
λοιπός 369
λοξός 193
λόχος 177

μάγειρος 230
μαιανδρώδης 211–213
μάλαγμα 275–276, 326
μάραθον 252
μείουρος 188
μέλιτι ἐφθῷ 248
μεσοπύργιον 30, 158–159
μεταλλάσσειν 299
μετάλλευσις 138, 278
μεταπύργιον 30, 158–159
μέτοικος 348–349
μετρητής 14
μὴ ἀνοήτως 374
μήκων 225–226
μὴ παρέργως 309
μηχανή 171
μηχάνημα 28, 32
μηχανοποιός 185, 257
μνᾶ 13–14
μόλιβος 260
μολόχη 249
μοναγκών 281
μοχλός 373

ναπτάλιον 264–265
ναυπηγήσιμος 262
νάφθα 264–265, 303

ξένος 46, 306
ξεστός 234
ξιφοδρέπανον 364–365
ξύλῳ διακινεῖν 248

ὀβελίσκος 291
ὁδοποιεῖν 323
οἰνηρὰ τρυγία 228
οἶνος κεκραμμένος 250
ὁλκάς 317
ὁμιλητής 381
ὀνεύειν 355, 367
ὀνίσκος 203
ὄνος 203
ὄξος 261
ὀξυβελής 31
ὀπή 291
ὅπλα 256
ὅπλισις 347–348
ὁπλίτης 305–306, 348–349

ὄργανον 31, 257, 330
ὄργυια 13
ὀρθιος 28, 32–33, 153
ὀρθός 162–163, 183
ὀρθῶς ἔχει 26
ὀρίγανος 239–240
ὁρμιστηρία 277
ὄροβος 224–225, 249
ὀροφή 183
ὄσπρια 239
οὖρον 240–241
οὕτω 334

παλα(ι)στή 13, 315
παλιμπροδοσία 305
παλίντονον 281
παλίουρος 202
πάντοθεν 356
πάπυρος 282
παραγκιστροῦσθαι 326
παράδειγμα 198
παραθυρίς 183
παρακαλεῖν 355
παραπορεύεσθαι 378
παράστασις 203
παρασύνθημα 295
παρασυρεῖν 402
παράφορος 148
παρεμβάλλειν 248
πάροδος 151, 156, 209
πάσσαλος 384
πατάσσειν 285
πατρίς 217
πελεκᾶν 174
περίακτος 283, 345–346
περιαλείφειν 231
περιβάλλειν 230
περιελίσσειν 304
περικεφαλαία 301
περικλᾶσθαι 144
περιλεπίζειν 247, 247–248
περιτειχίζειν 391
περιτρέχειν 286
περιφερής 139
περιχαρακοῦν 338–339, 391
πετροβόλος 28, 31
πηδάλιον 402
πῆχυς 13
πιέζειν 392
πῖλος 301
πίσσα 259–260
πλάγιος 28, 32–33, 287, 291
πλέθρον 13, 201–202
πλίνθινος 146
πλινθίον 194–195
πλίνθος 146
πολιορκεῖν 374, 374–375
πόλις 34–36
πόλισμα 35 n. 77
πολίτης 274
πολλαπλάσιος 377
πολυάνδριον 216
πολωρεῖν 308–309
ποῦς 13
πριονωτή 184–185
προβλῆτες 358
πρόβολος 195
προδεικνύειν 353
προδοσία 54–56, 304–305, 382, 385–391
προεκτιθέναι 142
πρόκωπος 301
προμαχών 30, 149, 284
προνομεύειν 340
προορᾶν 211
προπειράζειν 366
προρρίπτειν 323
πρός 364, 372
προσαγωγή 311
προσκαρτερεῖν 375
προσρίπτειν 323
προστάσσειν 353
πρόσχωμα 320–321
προσχωννύναι 370
προτείχισμα 30, 175, 298, 304
πτῶμα 373
πυλεών 144
πύξινος 312
πυργόβαρις 189
πυργοποιία 28, 29, 181
πύργος 29, 135–136, 189–190, 280, 423
πυροφόροι 31, 283

ῥηγνύναι 137
ῥῆξις 197
ῥύμη 39–40
ῥυτός 326

σαλαμάνδρα 264
σάλπιγξ 357
σαπρός 266
σειρομάστης 366
σήσαμον 225
σίδηρος 256, 347
σιρός 230
σιταρχία 381
σιτοβολών 233

σιτοδεία 243
σκαφεῖον 258
σκίλλα 243
σκολιός 177, 184, 211, 213
σκόλοψ 202, 369
σκυτάλη 203
σπειράματα 262
σπιθαμή 13
σπλήνιον 331
σπουδάζειν 172
στάδιον 13, 181, 264
σταίς 251
στάσις 350
σταυρός 315
σταφίς 251–252
στέγη 282
στερεός 195–196
στεφάνη 388
στοά 32, 190–191
στόμα 312
στρατήγημα 396
στρατήγιον 37, 381
στρατηγός 295
στρατιώτης 46, 51, 274
στρογγύλον 362
στρωτήρ 235
στύππιον 261
συγγομφοῦν 316
συγκρουστός 234
σῦκον 251
συμβολή 316
σύμβολον 386
συμμετρεῖν 328
συμπηγνύναι 362
σύμπτωμα 373
συμφανές 178
συναναρτᾶν 315
συνανασπᾶν 315
συνεχής 235
συνεχῶς 199
συνηλοῦν 311
συνθεῖν 325
σύνθεμα 270–271
συνθεωρεῖν 353
σύνθημα 270–271, 295
συντελεῖν 144
συντετραίνειν 359
συντρίβειν 402
σύριγξ 203
σφήν 237
σχεδία 347, 398
σχῆμα 217
σχηματογραφεῖν 217
σχοινίον 261
σωλήν 279–280
σωτηρία 332

τάγμα 340
τάλαντον 13–14
ταρσός 402
τάφρος 30
τεδίονες 371
τείχισμα 29 n. 51, 304
τειχοποιεῖν 29 n. 55
τειχοποιία 28, 29, 394
τεῖχος 28, 29
τέλμα 206, 369
τέμενος 254
τεναγώδης 371
τῆλις 239
τίμησις 292
τοιχόκρανον 188
τοιχοποιία 28
τοῖχος 28, 29
τόξευμα 292
τραυματίας 306
τράχηλος 232
τρίβολος 32, 207–208
τρυγητός 336
τρύπανον 32, 286, 368
τρυπητήρ 267

ὑπαλλάττειν 315
ὑπαλοιφή 383
ὑπέρβασις 180
ὑπερῷος 232
ὑποδενδρυάζειν 372
ὑποκινεῖν 327
ὕπομβρος 178
ὑπομένειν 394
ὑπόνομος 179
ὑπορυκτικός 348
ὑπόρυξις 358
ὑπόστασις 195, 200
ὑποστεγνοῦσθαι 383
ὑποσύνθημα 295
ὑποτέμνειν 322
ὑπότμησις 365, 371
ὑπότροχος 345
ὑπόφαυσις 362
ὑποχείριος 325
ὑποχώρησις 372
ὑπόχωσις 372
ὑφάπτειν 364

φαλαγγοῦν 351

φάρμακον 225–226, 330
φείδεσθαι 274
φθείρειν 339, 396
φιλοτιμητέον 210
φοβεῖσθαι μή 379
φοινίκινος 226
φορμός 257, 259
φράγμα 312
φράττειν 312
φῦκος 205
φυλακτήριον 161–162
φυλή 38–39

χαλᾶν 281
χαλκός 256
χαλκοῦ ἄνθος 387
χάλκωμα 399
χαράκωμα 339
χαράκωσις 369
χάραξ 179, 315
χαρίεις 328
χεῖλος 209
χειμών 337
χεῖρες σιδηραῖ 367
χειροπληθής 292–293
χελώνη 18, 32
χηλωτός 208
χιαστός 314
χνοῦς 231
χοῖνιξ 14, 247
χολέδρα 351–352
χοῦς 14, 267
χορηγεῖν 330
χόρτος 376
χρεία 394
χῶμα 321
χώνη 241, 313, 371
χώρα 34, 35, 307
χωρεῖν 267
χωρίον 215
χωστός 314
χωστρίς 18, 346

ψαλιδοειδής 169
ψαλίς 160–161, 163, 234
ψιλά 183, 192
ψιλοί 305–306
ψυχή 344

ὠθεῖν 288
ὠλένη 238

GENERAL INDEX

(* marks toponyms which also have entries in the Gazeteer)

*Abdera, 34 n. 75, 35 n. 76, 210, 429
*Abydos, 53, 219, 297, 315, 359, 429
Achaeus, 375
Achaia and Achaians, 34, 154, 171, 384; Achaian Confederacy, 380
Adam, J.-P., 135
Aeneas Tacticus, 17, 24, 25, 25, 33–59, 220, 177, 222, 273, 282, 286, 288, 292, 294–295, 295–296, 298, 299, 300, 301, 302, 303, 304, 308, 335, 336, 382, 386, 388, 389, 390, 396; *Akousmata*, 379; *Paraskeuastikē*, 17, 33 n. 72, 58, 220; 266, 267–271, 273, 310, 398; *Poristikē*, 17, 33 n. 72, 58, 220; *Stratopedeutikē*, 33 n. 72, 302
Agathocles, of Athens, 308–309; of Syracuse, 377, 380
Agesilaus, 312, 344, 390
Agesipolis I, 137, 219, 342
Agesistratus, 18, 275, 293, 346, 411
agora, 38, 39, 292, 381, 382
*Agrinion, 338, 429
*Aigeira, 380, 429
aigilops (goat-grass, haver-grass), 253
*Aigosthena, 142, 429
*Ainos, 225, 429
Aitolians, 337, 338, 380, 381, 385
*Akanthos, 336, 429
Akarnanians, 381, 385
*Ake, 23, 35 n. 79, 264, 429
*Akragas, 219, 221, 283, 342, 370, 391, 392, 429
*Akrocorinth, 171, 312, 429
akropoleis (citadels), 36, 142, 162, 176, 181, 193, 196, 211, 221, 223, 232, 243, 253–254, 333, 368, 381, 382, 421, 422; see also Akrocorinth
Alcetas, 282
Alcibiades, 263, 350, 357
alder-wood, 410
ale, 266
*Alesia, 311, 350, 429
Alexander Balas, 145
Alexander the Great, 137, 152, 181, 185, 192, 197, 204, 205, 212, 228, 257, 259, 264, 272, 276, 277, 282, 308, 309, 313, 316, 321, 324, 325, 334, 343, 367, 371, 372, 384, 397
Alexander of Epirus, 350
Alexander of Pherai, 378, 417
*Alexandreia Troas, 162, 429
Alexandria, 22, 23, 24, 33, 229, 266, 319
*Alinda, 142, 196, 429
allies, 38, 47, 270, 274, 396; see also reinforcements
almonds, 247, 248
*Ambrakia, 190–191, 279, 281, 288, 319, 346, 359, 360, 365, 429
*Ambrakos, 314, 429
ambushes, 44, 177, 397
*Amphipolis, 295, 308, 341, 342, 345, 429
amphoda, 39–40, 290–291, 291, 293, 295, 295–296; amphodarchs, 40, 293, 295, 296
amphoras (lead), 318, 361
Amyntas III, 260, 262
Anaxippus (doctor), 329
anchors, 208, 322, 355, 370–371
Andreas of Karystos, 24, 221
andres agathoi, 216, 307, 379
*Andetrium, 310, 430
*Andros, 169, 330, 430
animals, 42–45; see also livestock, and under specific animals
Antigonus I, 228, 241, 282, 307, 309, 349; II Gonatas, 259, 338, 364; III Doson, 235, 260, 353
antikrios: see counter-ram
Antiochus III (the Great), 201, 308, 342, 343, 375, 380, 391, 417; VII Sidetes, 350; IX Cyzicenus, 324
Antipater (doctor), 329
Aphrodite, 254, 260
*Aphytis, 292, 430
Apollo, 174, 335
Apollodorus Mechanicus, 20, 21 n. 22
Apollonia Pontica, 34 n. 75
*Apollonia (Sozousa), 177, 193, 430
Apollonius, of Miletus (doctor), 329; of Perge, 22
appetite-suppressants, 58–59, 224, 244, 246, 248, 412

Apulia, 181
Arabia, 23, 252; 'Arabian potion', 263, 265; Arabic, 21, 22; Arabs, 403, 416
arakos, 228–229
Aratus, 302, 312
Arbela: see Gaugamela
Arcadia(ns), 335
archaeology, 16, 134–135
archeia, 37, 382
Archelaus, Macedonian king, 263; Pontic general, 318
archers, 164, 165, 167, 167–168, 192, 214, 272, 282, 311, 378; see also arrows
arches, 160–161, 169, 170, 173, 237; in granaries, 146, 234, 234–235, 235, 237; in walls, 160–161, 163, 189, 198, 237
Archidamus II, 347; III, 336
Archimedes, 18, 22, 168, 175, 179, 232, 279, 281, 363, 367
Archinos (tyrant of Argos), 294
Archylus, 343
archontes, 48, 50, 386
Arginusae (battle), 178
*Argos, 34 n. 75, 35 n. 76, 37 n. 86, 38, 54, 141, 193, 199, 210, 214–215, 294, 297, 308–309, 381, 430
Aripharnes, 209
Aristippus, 335
Ariston (Ph.'s dedicatee), 22–23, 26, 50, 135, 218
Aristotle, on fortifications, 133
*Arkesine, 374, 430
Armenia, 266
arms and armour, 47, 49, 227, 256, 259, 268, 293–294, 305–306, 349
(?)Arrhibaeus, 289–290
Arrhidaeus, 290, 297
arrows, 264, 292, 296, 329
Artemidorus (cookery writer), 228
Artemis, 337
Artemisium, 399
artillery, 20, 24, 30–31, 49, 52, 133, 211, 237; ammunition for, 151, 257, 265, 323; in attack, 133, 140, 143, 143–144, 148, 155–156, 165–166, 171–172, 172–173, 198, 323, 333, 342, 352, 356, 360, 400; in defence, 49, 55, 140–143, 151, 161, 163–167, 170, 175–176, 178, 189, 191, 199, 202–203, 214, 256, 257, 273–274, 277–278, 288, 289, 293, 296, 311, 312, 328, 348, 352, 360, 405, 406; see also artillery-emplacements, catapults, stone-projectors
artillery-emplacements, 38, 136, 145–146, 166–167, 175, 175–176, 212, 327
Artyaktes, 219
arums, 255
Asclepiades of Perge (doctor), 328
ash(es), 136, 249, 361, 415, 425, 426
ash-wood, 155
Asidates, 291
*Asine, 141, 145, 172, 430
asphodel, 240, 244
asps, 264
assault-bridges, 272, 284–288, 321–322, 324, 326, 347, 356, 366–367, 415
*Assos, 148, 165, 170, 430
Astyanax (Rhodian general), 216
à tenailles, 185
Athena, 206, 343
Athenaeus Mechanicus, 17–18, 20, 275, 276, 345–346, 409–411
Athenagoras of Miletus, 307
Athenion, 335
Athenocles, 260, 283
Athens and Athenians, 136, 144, 199, 204, 206, 210, 216, 219, 224, 225, 228, 230, 231, 235, 247, 257, 259, 261, 263, 264, 274, 289, 292, 293, 302, 308–309, 313, 316, 317, 318, 319, 323, 334, 335, 338, 350, 357, 359, 381, 387, 392, 397; see also individual Athenians
Athos (Mt.), 264
*Attaleia, 216, 319, 430
*Aulis, 227, 430
autarkeia, 228
*Avaricum, 343, 430
axes, 174, 258
axles, 283, 345–346, 409–411

*Babylon, 18 n. 7, 23, 35 n. 79, 136, 137, 148, 150, 174, 264–265, 342, 408, 430
Balearic Islands, 293
*Barke, 34 n. 75, 359, 430
bandages, 330–331
barbs, 325–326; see also hooks
barley, 222–223, 224, 230, 239, 247, 249, 266–267, 426, 427; barley-wine, 266
Barocius (Francesco Barozzi), 244
barricades, 258, 292, 323
baskets, 257, 259, 275, 289, 298, 367, 370
bastions (*bareis*), 30, 189–190, 197
battlements, 30, 40, 143, 149, 260, 284–285, 285, 286, 290, 291, 383, 414; see also parapets
beacons, 398; see also fire-signals

'beaks', of towers, 196; of warships, 316, 318, 321, 355, 357, 358, 399
beans, 239
beds (as measurement of floor-area), 162
bees and wasps, 43 n. 104, 246, 331, 387
bevelling, 165, 200
birds, 44, 241; birdlime, 264, 361
Biton, 20
bitumen, 18 n. 7, 264–265, 408
bivouacs: see night-watches
bladders, 389
blockades, 47, 52, 56–59, 219, 228, 322, 333, 338–339, 382, 391–393
blood, 228, 361, 415
blower (*enetêr*), 283–284, 285, 368
boats: see ships
Boges, 342
bolboi, 243, 245
bolt-firers (*oxybeleis*), 31, 203, 272, 320, 333, 352, 354, 400; see also artillery, catapults
bonding (between curtains and towers), 196, 197
boots, 366
bosses/bossing, 148, 153, 172–173, 199–200
boxwood, 311–312
Brahmins, 264
Brasidas, 284, 336, 343
bread, 223, 224, 226, 228, 241, 249, 250, 251, 255, 266, 426
bribery, 54–55, 219, 295, 339, 377, 390–391, 396, 397
brick(s), 137, 142, 146, 146–147, 186, 194–195, 232, 234, 235, 236, 237, 256, 259, 286, 291, 342, 384, 408, 415
bridges (pontoon), 316, 317, 362
brimstone: see sulphur
Brinkmann, A. 15
bronze, 41, 133, 199, 256, 267, 268, 272, 295, 360, 399
broth, 253
buckets, 258
Buecheler, F., 15
building-inscriptions, 134, 136, 144, 155, 159, 173, 174, 198, 210, 284, 383
buoys, 286, 313–314
burial, 42, 48, 49, 51, 54, 216–217, 308
butchers, 230
butter, 252–253, 376
*Byzantium, 18, 21, 24, 166, 263, 266, 306, 307, 322, 350, 357, 430; see also Constantinople

cabbage, 255
Caesar, Julius, 190, 255, 311, 342, 343
Calas, 301
calcium oxalates, 255
*Cales, 337, 430
Callicratidas, 178
caltrops: see triboloi
Campbell, B., 16
camps, 39, 191, 194, 205, 220, 333, 339, 344–345, 393, 394, 395, 397
cannibalism, 58 n. 147
caps, 300, 301
cargo-vessels, 166, 317, 319, 320, 339, 354, 355, 398, 402
Carthage and Carthaginians, 138, 143, 150, 181, 202, 204, 221, 268, 269, 276–277, 277, 278, 303, 311, 314, 334, 340, 342, 344, 359, 376, 380, 392, 402; see also individual Carthaginians
*Carthago Nova, 338, 342, 380, 430
Casaubon, I., 33
casemates, 161, 163, 189
*Casilinum, 278, 392, 430
Caspian Sea, 201
Cassander, 145, 292, 338, 391–392
Cassius (tyrannicide), 392
cataphracts, 354, 363, 400
catapults, 24, 27, 28, 31, 40, 140, 145, 146, 155, 161, 164, 166, 167, 170, 175, 176, 186, 189, 208, 237, 257, 272, 281, 282, 283, 293, 296, 318, 320, 325, 327, 359, 392, 406, 411; see also artillery, bolt-firers, stone-projectors
Cato Uticensis, 256
Catulus, C. Lutatius, 402
caulking, 261
cauterization, 43
cavalry, 43, 206, 220, 268, 269, 305, 376
cedar-wood, 410
cement, 137, 231, 425; see also mortar
Chabrias, 277
chaff, 44, 231, 276, 370, 410, 411, 425
chains, 313, 313–314, 315–316, 322, 371
*Chalkedon, 34 n. 75, 278, 338, 381, 430
Chalkidian League, 260, 262
*Chalkis, 24 n. 75, 38 n. 88, 238, 241, 298, 381, 430
chara, 255
Charilla, 323
cheese, 224, 249, 377
chickling, 228–229
chickpeas, 223–224
children, 41–42, 45, 289, 297, 308, 309, 350
*Chios, 34 n. 75, 37 n. 86, 38 n. 88, 48, 164, 190, 227, 260, 275, 313, 430

chlamys, 302
choinix, 247, 391, 426
Choisy, A., 345
Chorienes, 228
Chremonidean War, 321
Christ's-thorn, 202
Chryseis (wife of Antigonus Doson), 260
Cimon, 136, 342
Cineas, 17+n. 17
citizens, 46–47, 48–49, 50–51, 53, 57, 227, 242, 245, 274, 288–289, 292, 293–294, 296, 299, 307, 308, 309, 340–341, 350, 379, 380, 386, 405
clay, 146, 238, 415, 425, 426
Cleander, 306, 307
Cleandridas, 382
Cleon, 403
Cleonymus, 390
Cleoxenus, 270
clover, 225
cockerels, 43
Codellas, P.S., 244–245
coinage, 227
colocynth, 255
Colossus of Rhodes, 159
comedy (Attic), 389
compresses, 330, 331
concrete, 425
Constantinople, 254
coping (of a wall), 188
copper, 256, 387; copper sulphate, 387
coral, 267
*Corcyra, 34 n. 75, 38 n. 88, 297, 430
cords: see ropes
*Corinth, 180, 305, 328, 391, 397, 430; see also Akrocorinth
corks, 267–268, 269–270
Cossaeans, 228
counter-mining, 152, 258, 347, 358–359, 369, 413
counter-ram (*antikrios*), 191, 285, 286–287, 287, 368
counter-trenching, 152, 298
counter-wall, 288
cranes, 281, 319, 363, 368
Crassus, 339
crescent-shaped, battle formation, 399–400, 401; wall (lunette), 182
crowbars, 372, 373
cryptography, 21, 33 n. 72, 361, 386–387; see also steganography
Ctesibius, 18, 22, 24
cuckoo-pint, 255
'curtains' (wall), 30, 133, 141, 142, 147, 149, 151, 155–164, 164, 166, 167, 170, 171, 173, 181, 182, 184–189, 193–194, 196–197, 200, 212–215, 282, 342, 357, 363, 406, 412, 420–423
Cyrus, the Great, 342; the Younger, 307, 353

daggers, 301
Dalby, A., 220n.
Dalmatians, 310
*Damascus, 153, 430
Damis, 282, 311
Darius I, 262, 278; III, 308, 309, 311
Datamas, 41
dates and date-palms, 24 n. 36, 226–227, 254–255, 275, 326, 346, 351, 385
Decius Vibellius, 390
deer, 230, 238
*Delion, 284, 430
*Delos, 161, 183, 233, 370, 383, 430
*Delphi, 169, 239, 329, 430
*Demetrias, 139, 150, 154, 157, 167, 196, 200, 215, 333, 430
Demetrius (I) Poliorcetes, 152, 155, 159, 164, 166, 172, 191, 203, 206, 211, 216, 259, 279, 280, 293, 297, 324, 334, 345, 350, 351, 354, 356, 358, 359, 375, 380, 398
Demetrius I of Syria, 145
Democlitus, 270
Demosthenes, 152, 323
De obsidione toleranda, 19, 190, 222, 256, 359
De re strategica: see Syrianus Magister
deserters, 349
*Didyma, 174, 431
diekplous, 399
Diels, H., 15, 16
"Dig for Victory" campaigns, 58
Diodorus of Samos (doctor), 329
Diodorus Siculus, 31 n. 63, 305, 355, 356, 357
Diogenes, 224
Dioitas, 357
Dio of Alexandria (philosopher), 266
Dion, 181
Dionysius of Alexandria (inventor), 237
Dionysius I, 202, 283, 305, 307, 334, 340, 343, 351, 354, 375, 380, 390; II, 181, 385
Dionysodorus, 340
discutients, 253
ditches: see trenches
diuretics, 250, 261
divers, 322, 371

doctors, 36, 49, 328–332; see also medical equipment, medical vocabulary, and under individual doctors
dogs, 43
"dolphins", 318–319
doors (put to military use), 311, 366
doorways, of granaries, 236, 237; of towers, 160, 169–170
drainage-channels, 370
Drakon, 223
drapes (as protection against cross-fire), 323
draught-animals, 44, 45, 375; see also livestock
*Dreros, 335, 431
*Drilai, 205, 431
drills (siege), 32, 260, 286–287, 356, 368
drugs, 58, 330; see also poisons, recipes
drumlins, 139, 215
drunkenness, 336–338; in heifers, 43–44
*Dura-Europos, 137, 161, 177, 184, 360, 431
*Dyrrachium, 255, 431
dysentery, 253

*Echinos, 166, 172, 191, 319, 346, 351, 352, 431
Egypt and Egyptians, 23, 25 n. 42, 53–54, 153, 181, 199, 208, 225, 228–229, 233, 239, 249, 250, 255, 266, 275, 384–385, 415
*Eion, 342, 431
eisphorai, 47, 227, 380
*Elateia, 210, 289, 431
*Elephantine, 211, 431
elephants, 259, 282, 311, 364, 391–392
*Eleusis, 41, 144, 150–151, 230, 235, 431
Elis, 37 n. 85, 154
embankments, 314
embrasure, 165, 168
emmer, 251
en crémaillère, 185, 193
Engineering Compendium (of Ph.), 20–21
engineers, 55, 140, 185–186, 257, 272, 323, 348; see also individual engineers
Enipeus (R.), 333
envoys, 35 n. 78, 47, 49, 55, 355, 386
Epaenetus (cookery writer), 228
Epaminondas, 305, 335
ephebes, 176
*Ephesos, 151, 156, 167, 173, 177, 210, 292, 431
*Ephyra, 352, 431
*Epidauros, 235, 372, 431; healing miracles at, 330
Epimachus, 280, 324
Epimenides, 244, 412
Epipolai heights (Syracuse), 202, 302
Epirus, 148
epistolary form, 22
epitomization (of Ph.), 21 n. 22, 25–26, 32, 35, 135, 153, 167, 168, 175, 183–184, 192, 217, 220, 232, 248, 269, 270, 310, 346, 356, 360, 368, 371, 373, 374
*Eretria, 148, 431
*Erythrai, 210, 431
Euboia, 44
*Eumeneia, 234, 431
Eumenes I of Pergamum, 309, 342; II, 392
eunoia, 47, 309
Euphranor, 384
Euphrates (R.), 136, 148, 342
Euryalos fort (Syracuse), 166, 179, 201, 214
eutaxia, 306
excrement (human), 372
exiles, 45, 46
expenditure, 220, 347, 349, 377, 386; on bribery, 54–55, 219, 377, 386, 390–391, 396; on building(s), 140, 163–164, 172, 182, 197, 214; public, 47, 48, 49, 205, 221, 227, 256, 293–294, 305–306, 308, 330

Fabius Maximus ('Cunctator'), Q., 340
Fabricius, E., 16
families, 41–42
famine: see starvation
fathoms: see orguiai
fennel, 252
fenugreek, 239
festivals, 41, 51–52, 54, 176, 254, 308, 330, 335, 336–337, 350, 414
figs and fig-trees, 251, 254–255
fir-wood, 262, 263
fire, in mining, 138–138, 333, 359–360; protection against, 178, 231, 232, 261, 264, 275, 351, 361; used by attackers, 364, 400, 401, 402, 403; used by defenders, 223, 259, 260, 261, 262, 263, 265, 272, 282–283, 283, 284, 285, 288, 303–304, 304, 305, 317, 318, 369; see also incendiaries, *triboloi*, torches
fire-brands: see torches
fire-signals, 17, 50, 220, 262, 267–271, 274, 356; see also beacons
fish, 228, 229; fish-oil, 247, 265
flasks, 389
fleabane, 239–240, 426
fleeces, 361
flour, 239, 249, 251

'flower of copper': see copper sulphate
fodder, 225, 229, 231, 239, 376, 394, 395
food and food-supply, 35–36, 47, 49, 50, 55, 56–59, 219–230, 241–256, 340, 340–341, 342, 349–351, 374, 376–377, 381, 382, 391–393, 394, 394–395, 412; see also grain, starvation
footwear, 289, 366; see also boots, sandals, shoes
foraging, 57, 340, 341, 355, 379
foreigners, 42, 45–47; see also mercenaries, metics
foundations, of circuit-walls, 136, 137, 138, 278, 405, 407, 413; of granaries, 234
Fraser, P.M., 25
Frontinus, 273, 382, 390
fruit(s), 52, 243, 254, 255; see also under specific fruits
funnels, 241, 370–371

*Gabii, 382, 431
gaisoi, 359
gall-bladder, 229–230
gardens, 221, 243–244, 253–255, 283, 422
Garlan, Y., 16, 33, 63, 134–135; missing footnotes in, 204n.
gates and gateways, 35, 39, 40, 44, 52, 53, 133, 140, 144–145, 146, 170, 174, 213, 219, 289–290, 295–296, 298, 335, 351 405, 423–424; in amphoda, 40, 290, 295, 296; gatekeepers, 42, 53, 396; see also posterns
*Gaugamela, 311, 431
Gauls, 350
*Gaza, 311, 431
*Gela, 340, 431
generals, 18–19, 37, 47, 49, 50, 55, 295, 306, 309, 328, 340, 350, 353, 355, 357, 385, 396; generals' office (*stratêgion*), 37, 381, 382
ghee, 252
glue, 265, 388, 389
goat-grass: see *aigilops*
gods: see festivals, religion, temples, and under individual deities
gold, 268, 361
*'Goritsa', 200, 431
*Gortyn, 328, 431
*Gortys, 139, 154, 157, 184, 194, 196, 198, 215, 431
gourds, 255
grain, 44, 49, 58, 219, 220, 221, 222, 226, 230, 230–232, 234–235, 237–243, 249, 256, 261, 268–269, 330, 336, 391, 394, 395, 425–426; see also barley, food and food-supply, granaries, wheat
granaries, 29, 44, 50, 58, 146, 160, 169, 178, 183, 219, 220, 222, 229, 230, 231, 232–241, 425–427
Granicus (R.), 308
grapes, 239, 251–252
grape-hyacinth, 243
grapnels, 54, 319, 367, 372, 384–384; see also "iron hands"
grass, 225
grass-pea, 225
Graux, C., 15, 16
gravel, 136, 310
grazing: see pasturage
grease, 383, 414
guard-duties, 299, 371, 395; see also night-watches, patrols
guardrooms, 152, 161–163, 164, 170, 188–189, 189
(?)gutters, 351–352

Haase, F., 15
Hadrian, 216, 341
(H)agar, 416
hair, 146, 231, 256, 261, 425
*Halasarna, 190, 210, 329, 431
*Haliartos, 310, 431
*Halieis, 313, 431
*Halikarnassos, 152, 182, 204, 263, 282, 283, 334, 431
hammers, 384
hand-clasps (in greeting), 301–302
Hannibal, 180, 197, 278, 297, 309, 330, 340, 370
Hansen, M.H., 355
hapax legomena, 28, 180, 198, 208, 211, 264, 267, 286, 287, 289, 298, 323, 348, 358, 359, 365, 366, 371
Harappa, 232, 233
harbours, 36, 56, 163, 169, 220, 260, 287, 312–317, 319, 321, 322, 338–339, 341, 354, 355, 372, 391, 398; barriers/booms at, 260, 312–317, 338–339, 354, 355, 398; Ph.'s treatise on, 20, 33 n. 72
(H)arma, 213
harpoons, 208, 325, 326
harvest(-time), 54, 336
hats: see caps, kausia
haver-grass: see *aigilops*
hay, 44, 146
health, 133, 253, 254, 266–267, 376–377, 331, 404, 405
hedgehogs, 239
Hegetor, 166, 345
heifers, 43–44
*Heleon, 213, 432
Hellespont, 362
helmets, 41, 294, 301, 388
helopolis, 164, 279, 287, 323, 324, 345, 351
*Heloros, 136, 148, 432
Heracles, 364
*Heraia, 357, 432
Heraion (Samos), 335
*Herakleia-by-Latmos, 150, 156, 162, 165, 432
Herakleia Pontica, 34 n. 75, 38, 305
*Herakleia Trachinia, 148, 160, 192, 432
heralds, 55, 386
Hermias of Kos (doctor), 328–329
Herod the Great, 226, 278
Herodotus, 282, 345, 362, 379, 394; (medical writer), 366
Herophilus, 24, 221, 330, 331
Hexapyla (Syracuse), 338
hide(s), 44, 259, 260, 272, 276, 277, 352, 361, 368, 377; inflatable ladders made of, 24, 53, 383–384, 414
*Hierapolis, 210, 432
*Hierapytna, 174, 432
Hieron II, 279, 361
Hill, John, 223
*Himera, 34 n. 75, 138, 432
Himilco, 347
hippake, 224
Hippias (Athenian tyrant), 149
Hippocratic medicine, 17, 24, 221
Hippodamus, 293–294
*Hipponion, 160, 164, 432
hippopotamuses, 208
Histiaeus of Miletus, 263
*(H)istria, 136, 155, 432
Homer, 30, 41 n. 99, 137, 188, 209, 223, 224, 226, 227, 234, 249, 250, 260, 274, 321, 356, 388, 402
homonoia, 47, 53
honey, 202, 244, 246, 247, 248, 250, 252, 267, 330, 331
honours and rewards, 45, 48, 49, 55, 210, 216, 217, 257, 297, 306, 307–308, 308, 321, 342–344, 348–349, 378–379, 396; see also morale
hooks, 208, 325, 383, 384–385, 414, 415
hoplites, 45, 50 n. 124, 305–306, 348–349
horses, 43, 51, 54, 207, 209, 239, 253, 321, 366, 385, 392; mares, 224; see also cavalry
hostages, 35 n. 78, 42, 336
"hours", 246
houses, 29, 37, 38, 40, 133, 145, 151, 183, 221, 243, 244, 253–254, 290, 291, 292, 292–293, 296, 298, 307, 308, 341
hunger: see starvation
*Hyampolis, 206, 432
Hydna (diver), 322
*Hyllarima, 135, 140, 145, 432
Hyphasis (R.), 205
Hyrkania, 201

*Iasos, 177, 185, 432
Iberia and Iberians, 259, 266, 359, 397
identity-tokens, 46, 55
ikria, 156–158
Ilion, 34 n. 75, 35 n. 77, 41
*Iliturgi, 384
incendiaries, 31, 207, 276, 282–283, 285, 304, 317, 318, 320, 352, 369, 400, 410, 411; see also *triboloi*
India and Indians, 255, 261, 311; Indian Ocean, 252; Indus Valley, 232
ink, 387, 389
(?)inlets, 358
insects, 240
*Iotapata, 172, 239, 275, 285, 342, 370, 432
Iphicrates, 149, 302, 303, 357, 376, 397
iron, 53, 55, 133, 147–148, 169, 207, 256, 272, 295, 311–312, 313–314, 314–315, 318–319, 347, 348, 351, 358, 360–361, 372, 384, 385, 406, 410, 411, 413, 415;"iron hands", 272, 367, 372
*Isaura, 148, 215, 432
isinglass, 265
*Istros, 210, 432
*Itanos, 174, 432

javelins, 38, 40, 272, 282, 291, 311, 326, 359, 378, 413; see also lances, spears
Jerusalem, 139, 192, 278, 350, 373, 392; Jerusalem-thorn, 202
jogs and jog-walls, 149–150, 173–174, 178, 184, 200, 423
John Hyrcanus, 350
joists, 154, 183, 235, 287, 316
Josephus, 30, 275, 285, 342

"K" rations (U.S. army), 245
*Kadyanda, 157, 432
*Kamarina, 221, 432
*Kamiros, 136, 144, 210, 432
karbatinai: see leather-hides

Kassandreia: see Poteidaia
*Katana, 150, 432
*Kaunos, 156, 432
kausia, 301, 387, 388
Kaÿstros (R.), 341
Kerkeosiris, 229
kiki, 250
kinks (*kampai*) in walls, 420, 421, 423
Klazomenai, 34 n. 75
klepsydra, in lawcourts, 247; in signalling 268
*Knidos: 145, 432
*Knossos, 198, 328, 432
knots, 180
*Koresia, 176, 432
*Kos, 247, 328, 329, 432
*Krane, 197, 433
*Kynaitha, 302, 337, 433
*Kydna, 142, A161, 433
Kyrene, 34 n. 75
*Kyzikos, 192, 297, 301, 334, 357, 375, 433

Lacrates, 342
ladders, 24, 53, 154, 171, 208–209, 239, 261, 303, 324, 333, 337–338, 344, 351, 383–385, 414, 416; inflatable, 24, 53, 383–384, 414
Lake Sapra, 266
Lamachus, 330
*Lamia, 138, 382, 433
lances, 291, 294, 359, 366; see also javelins, spears
lanterns, 294–295
*Larisa, 333, 433
lassi, 377
lathyrism, 225
Lawrence, A. W., 16, 27–28
lead, 148, 256, 260, 283, 318–319, 360–361
Leake, W.M, 417
leather-hides (*karbatinai*), 289, 377, 378
*Lebadeia, 237, 433
*Lebedos, 241, 433
legumes, 58, 224, 228, 239; see also under specific legumes
*Lekythos (Torone), 284, 290, 343, 433
lemboi, 315–316, 320, 354, 362
Lenaios Artemidorou, 216–217
lentils, 225, 239
*Leontini, 259, 381, 433
Leosthenes, 382
lettuce, 255
*Leukas, 350, 433
lex Fannia, 228
libanotis, 222
Libya, 268, 298, 313, 347
lice, 251
light-armed troops, 43, 50 n. 124, 305–306; see also peltasts
*Lilybaeum, 143, 204, 359, 375, 376, 382, 402, 433
lime, 137, 408
lime-wood, 412
linen, 262, 324, 331, 416
lintels, 170
liquorice, 224
liturgies, 47, 227, 380
liver(s), 58 n. 147, 228, 229–230, 230, 233, 237, 238–239
livestock, 44, 45, 225, 229, 230, 261, 268, 323, 336, 352, 375–377, 392, 394, 425; see also draught-animals
lochagoi, 49
lofts, 232, 425
logs, 286, 287, 310, 362
Lokroi Epizephyrioi, 29 n. 56
Long Walls, Argive, 199; Athenian, 136, 155, 174, 198, 231
loopholes, 291
Lucania, 186
lupins, 224
Lykeion (Athens), 228, 323
Lysander, 350, 382
Lysimachus, 398
Lyttian War, 328

Macedonian army-regulations, 295, 308, 341, 342, 345
Macedonian cubit(?), 358
'machines', 28, 32, 44, 209, 281, 282, 283, 284–288, 303, 304, 305, 320, 321, 323, 327, 333, 342, 345, 347–348, 351, 353, 354, 373, 377, 400, 401, 409, 412; see also towers (mobile/siege)
Macander (R.), 211–213
Mago (general), 397; (writer), 202
Maier, F.G., 134
Mallians, 384
mallow, 244, 248–249
*Mantineia, 137, 139, 152, 177, 196, 201, 219, 336, 342, 433
manuscripts (of Ph.), 15, 245, 246, 248
Marcellus, M. Claudius, 337–338
marines, 354, 399, 400
markets, 46; for soldiers, 377
martial law, 45, 46, 48, 49, 51, 335
*Masada, 226, 433
masonry-styles, 134

masons: see stonemasons
*Massalia, 136, 433
mats, 238
mattocks, 258, 366, 372–373, 413
*Matropolis, 174, 433
McNicoll, A.W., 135
meat, 44, 47, 222, 227–230, 250, 252, 376–377
Mēchanikē Syntaxis (of Ph.), 20–21, 404
Media, 228
medical equipment, 31, 36, 49, 330–331
medical vocabulary, 24, 187, 195, 197, 221, 240, 246, 248, 249, 250, 252, 253, 283
Mediterreanean tides, 315
"Mediterranean triad", 239
Megabazus, 262
*Megalopolis, 23 n. 35, 138, 139, 152, 181, 186, 201–202, 223, 254, 256, 278, 282, 297, 311, 381, 433
*Megara, 34 n. 75, 41, 48, 199, 210, 259, 364, 381, 433
*Meliteia, 333, 433
(?)membranes, 388
Memnon of Rhodes, 301, 334, 338–339
Mempsis, 289–290
Menahem ben Yehuda, 139
Mentor of Rhodes, 307
mercenaries, 35 n. 78, 42, 46 n. 116, 47, 49, 51, 55, 216, 217, 274, 294, 296, 306, 307, 308, 309, 331, 342, 348–349, 417
merchant ships: see cargo-vessels
Mesopotamia, 206, 212
*Messana, 335, 433
*Messene, 139, 154, 183, 433
Messenia, 241, 242
*Metapontum, 186, 433
metics, 45, 46, 51, 55, 305, 348–349, 349
*Milatos (Crete), 335, 433
*Miletos, 141, 148, 154, 177, 184, 188, 193, 196, 209, 212–213, 214, 215, 433
military command, 48, 49–51, 343, 353, 355, 357
military technology, 52–53, 133, 383
milk, 44, 224, 255, 376–377
Miller, E., 156–157
millet, 224, 226
mines (tunnels), 138, 168, 191–192, 194, 197, 200, 212, 278–279, 288, 293, 333, 346, 358–360, 413; see also counter-mining
mining (commercial), 278, 358, 359
Minucius (M. Minucius Rufus), 181
Miracula Sancti Demetrii, 210, 314
mistletoe, 264
Mithradates II, 312; VI, 192, 312, 349
moats, 201
moles (siege), aggressive, 257, 272, 311, 321; defensive, 313, 319
molluscs, 263–264, 265
Molon, 206
monarchy, 33, 56
morale, 306–309, 331, 339–344, 349, 356, 378–380; see also *homonoia*, honours
*Morgantina, 349, 433
mortar, 137, 147–148, 148, 153, 164; see also cement
mosquitoes, 240
*Motya, 263, 283, 334, 343, 351, 354, 380, 433
mounds (offshore), 320–322, 357, 372
mud, 146, 231, 238, 425; see also brick(s), clay
Murray, W.M., 16
murus gallicus, 155, 406
*Myndos, 197, 433
*Mytilene, 243, 335, 339, 392, 434

nails, 311, 384
naphtha, 264–265, 303
*Naryka, 379, 434
naval (and amphibious) warfare, 16, 35, 310–322, 354–355, 357–358, 362, 370–372, 398–403; see also ships
*Naxos and Naxians, 34 n. 75, 394, 434
Nesiotic League, 380
nets, 261, 272, 275, 276, 325, 326, 361, 415
neurotoxins, 263
Nicias, 51 n. 126, 311, 366, 374, 394
night, 179, 263, 294–295, 299–303, 304, 336–337, 357, 371, 379, 383, 395, 397, 412, 414; night-watches, 294–295, 296, 299, 395; see also guard-duties, patrols
Nile (R.), 211
*Nisaia, 199, 290, 434
Nitocris, 148
nooses (*brochoi*), 192, 285, 325, 368, 372
*Numantia, 392, 433

oak, 155, 425
oak-gall, 387
oakum, 256, 259, 261, 262, 263, 282, 303, 304, 317, 383, 385, 414
oars, 36, 262, 262–263, 402
observers (*kataskopoi*), 396
*Odessos, 144, 210, 434
offal, 229–230; see also liver
oil(s), 225, 226, 229, 239, 247, 250, 252, 253, 256, 261, 330, 389, 392
*Oiniadai, 142, 174, 177, 434

*Oinoanda, 170, 434
*Olbia, 136, 144, 210, 434
olives, 229, 239, 246, 247, 251, 253; olive-pressing fluid, 229, 231, 232, 233, 425–426; olive-wood, 155, 406; see also oil(s)
Olympias, 391–392
*Olynthos, 392, 434
Onasander, 18–19
onions, 243
Onomarchus, 289
Ophellas, 298
Ophis (R.), 137, 201
Oppian, 229
oregano, 239–240, 426
orguiai (fathoms), 13, 188
orobos, 224–225, 249
*Orongis, 208, 367, 434
*Oropos, 144, 374, 434
outworks, 53, 151, 160, 175, 176, 178, 193, 195, 200, 201–207, 209–211, 212, 278–279, 298, 305, 372, 422
ox-piercers, 359
oxybeleis: see bolt-firers

paddings (*malagmata*), protecting 'machines', 351; protecting walls, 275–277, 326
Paeonia, 157
*Paestum, 141, 173, 201, 434
Pagasai: see Demetrias
*Pale, 138, 333, 434
Palestine, 24, 227
*Palibothra, 168, 434
palisades, 56, 149, 178–181, 193, 200, 202, 205, 212, 298, 312, 314–315, 333, 338–339, 339, 344, 369, 382, 391, 394, 397
palm-wood, 275, 326, 410, 411
panics, 302
papyri, 238, 247, 255; papyrus as food, 249
Parangelmata Poliorketika, 19–20, 244, 245, 412–416
parapets, 30, 148–149, 155, 161, 187, 194–195, 272, 344, 384, 394, 415; see also battlements
parasites, 251; see also vermin
Paraskeuastika (of Ph.), 395
(?)parchment, 388
*Paros, 210, 373, 434
Parthia, 201
passwords, 40, 270–271, 295, 299–300, 300, 301–302, 302–303; supplements to, 40, 295, 300, 301–302, 302–303
pasturage, 151, 375–376, 420, 421, 422
patris, 34, 217
patrols, 38, 40, 151, 156, 158, 183, 294–295, 299, 302; see also guard-duties, night-watches
Pausanias (Spartan regent), 289, 379
Paxamus, 267
pearl barley, 222–223
pebbles, 267
*Pednelissos, 156, 391, 434
pegs (for wall-climbing), 53, 384
*Peiraieus, 143, 148, 174, 198, 206–207, 231, 313, 318, 321, 350, 434
Peisistratus, 41
Pelopidas, 289
Peloponnesian War, 42, 44, 335
peltasts, 366
*Pelusium, 288, 342, 434
Perdiccas (II, Macedonian king), 263; Macedonian general, 181
*Pergamum, 148, 215, 232, 233, 254, 309, 434
*Perge, 156, 160, 161, 170, 285, 434
Pericles, 228, 347, 357
*Perinthos, 143, 288, 434
Perseus (Macedonian king), 392
Perseus (mythological hero), 364
Persia and Persians, 201, 219, 223, 264, 278, 293, 334, 359, 361, 381, 394, 399; see also individual Persians
*Perusia, 392, 434
pesticides, 229
*Petelia, 392, 434
Phalaris, 219
*Pharos (Dalmatia), 373, 434
*Pharsalos, 333, 434
Phayllus, 379
*Pherai, 333, 378, 434
*Philadelpheia, 342, 435
Philip II, 143, 185–186, 347; V, 53, 138, 154, 166, 172, 191, 238, 254, 297, 315, 319, 333–334, 337, 346, 352, 359, 374, 385, 417
*Philippopolis, 136, 179, 435
Philo(n) of Athens, 18+n. 8
Philon's Arsenal, 198
philotimia, 210
*Phleious, 223, 435
Phocians, 206, 377; see also individual Phocians
Phoenicia, 22 n. 26, 24, 227, 264, 276
Phormio, 364
phylai: see tribes
*Phyle, 195, 435
pickling, 228

pigs, 229, 259, 364
pillaging: see plundering
pine-wood, 410
'pipe' (for dropping large stones), 279–280; equivalent to siege stoa, 191
pirates, 315
*Pisye, 210, 435
pitch, 239, 256, 259–260, 260, 261, 262, 282, 303, 313, 317, 383, 400
pitchforks, 208
pits, for grain-storage, 230–232, 232, 237–241; in outworks, 202
planks, 226, 239, 311, 346, 371; hinged, 280–281; in ship-borne "tortoises", 362; protecting 'machines', 351; protecting walls, 275, 277, 326, 367
plaster, 235
*Plataiai, 34 n. 75, 39, 41, 48, 138, 152, 169, 179, 182, 192, 277, 281, 288, 297, 320, 335, 336, 337, 381, 392, 435
platforms, of machines, 286–287; underwater, 313–314
Plato, 23 n. 30, 52 n. 130, 215, 293, 327; on fortifications, 133
Plistarchus, 145
plundering and pillaging, 377, 379–380, 393–394, 397
Po Valley, 226
poison(s), 30, 195, 225, 231, 247, 255, 263–266, 366, 395; see also drugs, recipes
poles, 208, 364, 367, 416
polis, 34–59
Polyaenus, 273
polyandria, 48, 216
Polybius, 17, 39, 53, 190, 275, 279, 302–303, 305, 311, 323, 344–345, 353, 355, 373, 375, 381
Polyidus, 18, 50, 185–187, 257
Polyperchon, 138, 152, 181, 256, 278, 282, 297, 311
pomace, 251
Pompey, 312
ponds, 206, 369
poppies, 225, 225–226, 244, 245, 249
porticus, 190
Porus, 282
Poseidonia: see Paestum
Posidonius (engineer), 324
posset, 225, 250
posterns, 145, 150–151, 160, 174, 176–178, 183, 189, 213, 237, 338, 421, 424
*Poteidaia/Kassandreia, 34 n. 75, 58 n. 147, 160, 338, 392, 435
*Potidaion, 210, 435
potions: see recipes
pots, 248, 253; as booby-traps, 47, 49, 205, 206, 222, 365, 413; in grain-preservation, 232; in signalling, 267–269
'powder', 231
*Priene, 154, 156, 162, 184, 185, 435
*Prinassos, 138, 435
Pritchett, W.K., 7, 394
probes (*seiromastai*), 365–366
proclamations, 45, 46, 55, 57, 339–340, 342–343, 347, 355
property-censuses, 292
prussic acid, 247
*Psophis, 333, 337, 435
Ptolemies, 24, 380; I Soter, 181, 239, 311, 349, 380; II Philadelphus, 22, 23, 361, 380; III Euergetes, 22 n. 26, 261, 262; IV Philopator, 24, 221; V Epiphanes, 302
pulleys, 415
pulses, 239; see also specific pulses
pumpkins, 255
purse-tassels, 243
*Pydna, 338, 391–392, 435
Pyrrhus, 143, 297, 381, 390

Rabbatamana: see Philadelpheia
rafts (and "rafts"), 20, 280, 347, 362, 398, 400, 415
rafters, 235, 410
(?)raisins, 251–252
rakes, 366, 413
ram (battering-), 32, 44, 140, 142, 143, 144, 156, 166, 191, 192, 198, 212, 260, 272, 284–288, 345, 356, 358, 362, 363, 368, 377, 407; ram-emplacements, 287; see also counter-ram
ramps, 209
Rance, P., 180
ransoming, 336
ravaging, 57, 339–340
"ravens" (*korakes*), 272, 286, 356, 367, 368
ravines, 213
recipes, 220–221, 225–226, 243–253, 261, 376, 412; see also drugs, poisons
reed(s), 235, 238
re-entrants (in wall-traces), 173, 182, 184
reinforcements (troop), 55, 151, 374, 393–403
religion, 37, 41, 51–52, 54, 227, 230, 253–254, 260–261, 335, 343, 416, 423; see also festivals, temples
rewards: see honours and rewards
*Rhamnous, 210, 435

*Rhegion, 283, 339, 390, 392, 435
*Rhodes, 22, 23, 24, 25 n. 42, 35 n. 79, 50, 138, 151, 152, 158–163, 163, 164, 166, 170, 172, 179, 181, 182, 189, 191, 194, 203, 206, 210, 216, 227, 235, 239, 259, 260, 261, 262, 263, 280, 283, 293, 297, 307, 317, 324, 345, 350, 351, 354, 356, 358, 359, 380, 392, 435; earthquake (of 227) at, 159, 235, 260, 261, 262; see also under individual Rhodians
rhymai and rhymarchs, 39–40, 42, 49
ricocheting of projectiles, 144, 148
Rigaltius (Nicolas Rigault), 359
rings (*krikoi*), 285, 368
rivers, 36–37, 136, 213, 280, 312, 341–342, 342, 384, 405, 420, 422–423; see also specific rivers
roads, 206, 405; perimeter, 151, 209, 290
rock(s): see stone(s)
rock-projectors (*petroboloi*): see stone-projectors
Rochas d'Aiglun, E.A.A. de, 15, 16, 185
(?)rollers, 351, 362
Rome and Romans, 39, 53 n. 132, 160, 175, 179, 180, 190, 204, 228, 232, 233, 239, 259, 274, 279, 310, 334, 340, 342–343, 344–345, 346, 350, 359, 360, 363, 365, 367, 370, 373, 373–374, 375, 376, 380, 382, 384, 385, 391, 392, 417; see also individual Romans
roofs, of granaries, 219; of houses, 289, 297; of 'pipes' (= stoas), 191; of temples, 259–260; of "tortoises", 362–363, 413; of towers, 183; of walls, 155, 161, 284–285
rope(s) and cord(s), 179, 180, 261, 262, 272, 276, 277, 280, 280–281, 281, 282, 322, 326, 363, 368, 383, 384–385, 415
rowing-boats, 316–317
rudders (*pēdalia*), 402

sacks, 370; sack-cloth, 276–277
*Saguntum, 197, 297, 435
sails, 275; sail-cloth, 261
salamanders, 264
*Salamis (Athens), 210, 435
*Salamis (Cyprus), 279, 283, 293, 375, 435
salients, 173, 182, 184, 199, 212–213, 214–215
sallies: see sorties
sally-ports: see posterns
*Salona, 196, 435
salt and salting, 227–228, 229
Salvius (Tryphon), 349
*Samikon, 193, 374, 435
*Samos, 141, 176, 242, 335, 341, 376, 435
*Samothrake, 241, 242–243, 435
sand, 136, 137, 231, 259, 272, 408
sandals, 366, 388
Sapra Thalassa, 266
*Sardis, 380, 435
Sarmatians, 209
Satyros, 209
saws, 184, 407; sawdust, 392
(?)scaffolding, 156–158
Schoene, A., 15; H., 15; R., 15
Schramm, E., 15, 16
scimitars, 364
Scipio Aemilianus, 274, 311, 314; Africanus, 259, 316, 338, 342
'scoops' (*antlētēria*), 372
Scopas, 302
Scranton, R.L., 27
screens, protecting troops, 168–169, 190, 192, 200, 303, 344; protecting tortoises, 362; protecting walls, 259, 277, 323, 367
Scylli(a)s (diver), 322
scythes and sickles, 272, 277, 309–310, 364–365, 367, 368; 'sword-scythes', 364–365
sea, 36, 56, 310–322, 338–339, 354–355, 356, 357–358, 366, 370–371, 372, 378, 391, 393, 398–403; sea-water, 36, 283, 345; seaweed, 36, 205, 222, 272, 276, 361, 370, 411
secret messages: see cryptography, steganography
sedition: see stasis
*Segesta, 380, 435
Seleucids, 24, 340; see also Antiochus
*Seleukeia in (?)Pamphylia, 328, 436
*Seleukeia Pieria, 343, 391, 436
*Selge, 375, 436
*Selinous, 139, 164, 170, 206, 214, 221, 297, 344, 380, 436
*Sellasia, 213, 436
*Selymbria, 242, 263, 436
sentries and sentry-rounds: see patrols
Septimius Severus, 166, 322
Septuagint, 30, 166, 189, 233, 262, 285, 320, 359, 362, 366, 388
sesame, 224, 225, 245, 246, 248, 249
*Sestos, 219, 436
shields, 41, 272, 294, 326
ships, 36, 51, 54, 56, 157, 164, 261, 262, 268, 277, 286, 310–322, 338–339, 351, 354–355, 357–358, 363, 364, 370–371, 398–403; see also cargo-vessels, *lemboi*, naval (and amphibious) warfare, *Syrakosia*
shoes, 388–389, 413
shops, 46, 229
shovels, 258
shutters, 169
Sicanus, 317
Sicily, 23 n. 29, 268, 274; see also specific Sicilian cities
sickles: see scythes
*Side, 139, 156, 157, 161, 165, 182, 196, 197, 209, 212–213, 213, 285, 436
*Sidon, 201, 436
signals: see fire-signals
*Sikyon, 36, 155, 211, 223, 254, 381, 384, 436
*Sillyon, 156, 213, 436
silos, 231
silver, 361
sinews, 256, 392
*Sinope, 41, 312, 339, 436
Siraces, 209
Sirynx, 201, 203, 205
skins: see hides
skirmishes, 298
*Skotoussa, 29 n. 50, 150, 151, 173–174, 417–424, 436
*Skyros, 148, 436
Skythian and Skythians, 221, 224, 252
slaves, 41, 42, 44, 45–46, 51, 55, 216, 297, 348–349, 349
slingers, 192, 260, 272, 293, 378
smoke (military use), 194, 359, 360, 413
smoking (of food), 228
*Smyrna, 216–217, 290, 436
Social War (fourth-century), 376
Socrates, 340
Sogdiana, 228, 343, 384
soldiers, 46, 47, 48, 50–51, 53, 55, 57, 268, 274, 288–289, 292, 293, 294, 296, 299, 307–308, 309, 312, 331, 339–341, 342–344, 347, 348–349, 355, 356, 357, 364, 365, 376–377, 377–379, 381, 384, 391–392, 395, 397, 399; see also hoplites, light-armed, marines, mercenaries
*Soloi (Cilicia), 398, 436
Solon, 223
sorties, 143, 145, 150, 176–178, 178, 183, 192, 283, 391
Sosis, 144
Sotades, 361
*Sounion, 167, 210, 352, 359, 436

Sparta and Spartans, 35 n. 77, 38, 249, 274, 292, 305, 310, 312, 342, 379, 381, 382, 390, 391; see also individual Spartans
Spartacus, 339
spears, 195, 214, 291, 292, 300, 301, 320, 326, 330, 365; spear-projectors, 320; see also javelins, lances
spelt, 251
*Sphakteria, 249, 436
spikes, 311
spits, 40, 291
sponges, 36, 261, 361, 387, 389
spur-walls: see jogs
squashes, 255
squill, 243, 244, 245, 247, 247–248, 248, 249, 250
stakes, 202, 311, 312, 314, 314–315
starvation, 47, 56–59, 219, 224, 226, 229, 243, 244, 245, 246, 350–351, 382, 391–393; see also blockade
stasis, 36, 38, 47, 51, 52, 53, 54–56, 292, 348, 350, 390–391
stavesacre, 251
stealth and surprise, 53–54, 333, 334, 335–338, 383, 383–385, 385, 392, 414
steering-oars: see rudders
steganography, 41, 55, 386, 386–387, 388, 389; see also cryptography
stern-posts, 399
stoa (siege), 32, 183, 190–191, 205, 210, 279–284, 327, 345, 346, 370, 409
stone(s), 136, 138, 145, 259, 408; bossing etc., 172, 174; 'for building', 256, 257; buttresses(?), 157–158; in granaries, 232, 234, 236–237; plinths, 167; in towers and walls, 146, 147–148, 151, 153, 164, 186, 198, 199–200, 319, 368, 369, 372, 372–373, 384, 408, 415; used by defenders, 151, 257, 258, 275, 279–280, 281, 282, 292–293, 296, 309–310, 323–324, 365, 367, 384; underwater obstacles, 320–322, 372; see also stonemasons, stone-projectors, stone-throwers (human)
stonemasons, 140, 141, 198, 199
stone-projectors (*lithoboloi* [and *petroboloi*]), 27, 28, 31, 40, 142, 143, 148, 152, 153, 165, 167, 170, 172–173, 188, 191, 198, 199, 202, 203, 209, 210, 257, 272, 275–278, 279–280, 281, 289, 293, 296, 303, 317–320, 323, 326, 327–328, 333, 352, 354, 359, 362, 363, 370, 400, 410; see also artillery, bolt-firers, catapults

stone-throwers (human), 289, 378
storms, 336–337, 371
*Stratonikeia, 290, 436
*Stratos, 177, 385, 436
straw, 146, 235, 238
Strymon (R.), 342
Stymphalos, 33
suet, 251
Sukkot, 350
Sulla, 143, 318
Sullivan, D.F., 19
sulphur, 256, 259, 260–261, 261, 263, 282, 303, 317
Susa, 283
surprise: see stealth
swords, 143–144, 259, 294, 301
Sylloge tacticorum, 337, 387
Syloson I, 335
*Syracuse and Syracusans, 34 n. 75, 51 n. 126, 168, 175, 179, 181, 184, 201, 202, 214, 279, 281, 302, 311, 313, 316, 317, 319, 337, 337–338, 338, 363, 366, 367, 374, 385, 392, 394, 436; see also individual Syracusans
Syrakosia (ship), 279, 319, 361
Syria, 22 n. 26, 24, 227
Syrianus Magister, 19

Tabernacles (festival), 350
tamarisk-wood, 412
*Taras/Tarentum, 263, 368, 436
Tarquinius Superbus, 382
Tartars, 223
*Tauromenion, 23 n. 29, 375, 436
*Tegea, 335, 436
teichopoiia, 28, 29, 133–135; see alo wall-traces
*Teichos Dymaion, 154, 436
Teles of (?)Megara, 224
*Telos, 136, 210, 436
Temkin, O., 244
templates, 140, 198
temples, 37, 153, 237, 404
*Tenos, 329, 436
*Teos, 34 n. 75, 144, 161, 210, 241, 284, 437
*Thasos, 136, 148, 206, 392, 437
*Theangela, 167, 437
theatres, 38, 39, 159, 292
*Thebes (Boiotia) and Thebans, 181, 201, 289, 292, 312, 335, 336, 381, 437; see also individual Thebans
*Thebes (Thessaly), 138, 333, 437
Themistocles, 148, 206
*Theodosia, 357, 437
Theramenes, 240
*Thermopylae, 298, 437
Thesmophoria, 41
*Thessalonica, 210, 314, 437
Thessaly and Thessalians, 185, 200, 206, 333, 378, 417–424
Thévenot, M., 15, 16
Third Macedonian War, 392
*Thisbe, 141, 437
*Thouria, 242, 437
thorn-hedges, 202, 206, 369
Thrace and Thracians, 179, 226, 230, 263
threshing, 207, 224, 230, 231
Thucydides, 312, 331, 343, 347
thunderbolts, 304
tides, 315
tiles and tiling, 235, 360–361
timber, 258; for burning, 138, 262, 359; floats, 313; in granaries, 232, 233; ladders, 338; lanterns, 294–295; in mobile towers and "tortoises", 32, 319, 361; palisades, 369; pegs, 384; protecting walls, 277; rafts, 398; scaffolding(?), 156–158; in ship-building, 36, 260, 262–263, 361; in shoes, 366; signalling for more, 268; see also logs, poles, trees, and under specific woods
Timotheus, 259, 340, 341, 365, 400
tin, 256, 388
Titus, 192
TLG on-line, 16, 63, 358
tombs, 216–217
torches, 256, 263, 283, 285, 303, 317, 364, 369, 400
*Torone, 259, 284, 290, 343, 365, 437
"tortoises", 32, 139, 205, 277, 303, 304, 305, 327, 346, 352, 401; digger, 168–169, 288; filler, 18, 32, 204, 345–346, 346, 347, 362–363, 372–373, 409–411, 413, 416; ram-carrying, 32, 287, 345–346, 363; ship-borne, 354, 362; wicker, 32, 190, 259, 282, 327, 353, 362, 365, 412
towers (funerary), 48, 216–217
towers (mobile/siege), 29, 32, 142, 168, 170–171, 171, 193, 205, 212, 223, 272, 279, 280, 284–288, 304, 324, 326, 348, 351, 352, 354, 371
towers (structural), 29, 54, 133–135, 135–136, 137, 139–151, 152, 153, 154–155, 158–160, 162, 164, 165, 166–167, 168, 169–172, 175, 177, 182, 183, 184–185, 186–187, 189–190, 193, 194, 195–197, 197, 198–200, 200, 209, 212, 213, 214–215, 216–217, 219, 221, 236, 272, 276, 279–280, 282, 289, 290, 319, 321, 324, 327, 337–338, 342, 354, 363, 373, 381, 405, 406, 406–407, 420–424
tragedy (Attic), 324, 390
treachery, 47, 48, 54–56, 299, 299–300, 304–305, 308, 323, 333, 350, 382–383, 385–391, 392
trees, 254, 341
trenches, 30, 38, 47, 133, 151, 152, 175, 178–181, 201–207, 209–211, 212, 278–279, 288, 292, 298, 311, 312, 333, 338, 339, 345, 346, 347, 366–367, 369, 382, 391, 394, 397, 407, 413, 415
Triballians, 192, 397
tribes (*phylai*), 38–39
triboloi, 32, 207–208, 275, 304, 311–312, 317, 366, 367, 369, 400, 413
tridents, 272, 325–326, 371
*Troizen, 390, 437
troops: see soldiers
truces, 375–376
trumpets, 356, 357, 412
*Tunes (Tunis), 316, 437
tunnels: see mines
twine, 262
Tynnichus, 357
*Tyre, 137, 154, 181, 257, 259, 263, 272–273, 276, 277, 281, 288, 313, 316, 321, 322, 325–326, 367, 371, 372, 392, 437

urine, 240–241, 250, 425
*Utica, 256, 259, 368, 437
*Uxellodunum, 342, 437
Uzziah, 320

Vahlen, J., 15
vaults, 160–161, 163, 169–170, 188–189, 198, 235–237
vegetables, 52, 58, 243, 254, 255; see also specific vegetables
ventilation, in grain-storage, 233, 234, 425; in houses, 291
Veranius, Q., 18
vermin, 231, 261, 426; see also parasites
Vespasian, 172, 342
vetch(es), 224, 224–225, 228–229, 249, 250
Vincent, A.J.A., 188
vineae, 190, 210
vinegar, 232, 233, 246, 261), 267, 361, 410, 411, 427
vintage(-time), 54, 336, 414
vipers, 264
Vitruvius, 17–18, 275, 345–3 409–411
von Staden, H., 24, 221

wagons, 39, 44, 206–207, 25 372–373
'wagonfeet', 345, 409–411
walkways (*parodoi*), 155, 15 172, 187, 285
walls (circuit-), 28–30, 35, 3 133–135, 135–139, 151 154–155, 163–164, 164 183, 186, 187, 189, 190 201–202, 202–203, 204 211–213, 214, 215, 219 259, 265, 272, 278–279 284–285, 286, 288–294 303, 305, 309–310, 311 324–325, 333, 342, 342 357, 357–358, 368, 370 381, 383, 405–408, 412 see also curtains, jogs,
wall-traces, 37, 133–135, 14 211–215, 217; see also
wasps: see bees
water(s), 57, 136, 146, 165, 254, 341–342, 346, 370 413, 415; drinking, 220 265, 266–267, 339, 342 fire-fighting, 261, 352, 268–270; waterproofin water-table, 136, 138; 285; see also rivers, sea
wax, 246, 330–331, 383
wedges, 237
Wescher, C., 9n.
wheat, 223, 224, 230, 233, sheaves, 223, 230, 237
wheels, 209, 345–346, 351, 409–411, 413; scythed 365; to deflect projecti also water-wheels
whistling, 302
wicker, 32, 190, 259, 282, 370, 410, 411, 412
wicket-gates, 296
winches and winching, 203
wild chickling, 228–229
willow-wood, 412
windows, 149, 164, 165, 16 169, 183, 282, 286–28 233

wine, 226, 227–228, 247, 249, 250, 256, 261, 266, 330, 336, 337, 338, 377, 394; wine-lees, 227, 228; wineskins, 383–384
Winter, F.E., 134–135, 141, 157, 159–160, 163, 170, 174, 177
winter-time, 337, 414
women, 41–42, 45, 146, 289, 297, 308, 350; see also individual women
wood: see timber, trees, and under specific woods
wool, 276
wounds, 30, 36, 47, 165, 168, 265, 272, 274, 306, 307, 329–331, 333, 378, 405
'wrappings' (*amphiblestra*), 324–325, 326, 363, 416

*Xanthos, 210, 437
Xenophon, 33, 220, 339
Xerxes, 219, 253, 322, 362

yogurt, 377

*Zarax, 177, 437
Zeus, 237

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Zur Problematik eines monarchischen Körpers ohne Monarchie